State of Wisconsin

GUIDELINES FOR DESIGNATING FISH & AQUATIC LIFE USES FOR WISCONSIN SURFACE WATERS

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TABLE OF CONTENTS

NOTICE

Several terms and their associated acronyms occur throughout this document to refer to specific sub-categories or sub-classes of the fish and aquatic life use designation. The Department of Natural Resources will use the authority provided in Chapter 227, Stats., to seek revisions to the applicable Administrative Rules defining the terms for use designations including those represented in this document. Until such changes are formally promulgated in Chapter NR 102 of the Wisconsin Administrative Code, the following terms are identified as the legally applicable sub-categories of fish and aquatic life uses.

Applicable Rule Reference	Current Common Acronym
s. NR 102.04(3)(a) Cold Water Communities	CW
s. NR 102.04(3)(b) Warm Water Sport Fish Communities	WWSF
s. NR 102.04(3)(c) Warm Water Forage Fish Communities	WWFF
s. NR 102.04(3)(d) Limited Forage Fish Communities	LFF
s. NR 102.04(3)(e) Limited Aquatic Life Communities	LAL

The following table can be used to cross-reference current use designation sub-categories with terms that may be proposed in a formal effort to revise Chapter NR 102 of the Wisconsin Administrative Code.

Proposed Fish Aquatic Life Sub-Category and Associated Sub-Class	Proposed Acronym	Current Sub-Category as Listed in Wisconsin Administrative Code
Coldwater A • Class I Trout Waters • Class II Trout Water • Coldwater-a	**CW-A** • CW-A – Class I • CW-A – Class IIn • CW-A – CW	**Cold Water**
Coldwater B • Class II Trout Waters • Class III Trout Water • Salmonid Migratory Waters • Coldwater-b	**CW-B** • CW-B – Class IIx • CW-B – Class III • CW-B – MIG • CW-B – CW	**Cold Water**
Diverse Fish & Aquatic Life • Game Fish Waters • Non-Game Fish Waters • Macroinvertebrate Waters • Endangered, Threatened or Special Concern Species Waters • Intolerant Fish Species Waters • Coolwater Fish Species Waters	**DFAL** • DFAL-GF • DFAL-NG • DFAL-MC • DFAL-ETSC • DFAL-IF • DFAL-CC	**Warm Water Sport Fish (WWSF)** **Warm Water Forage Fish (WWFF)**
Tolerant Fish & Aquatic Life • Tolerant Fish Waters • Tolerant Macroinvertebrate Waters	**TFAL** • TFAL-F • TFAL-M	**Limited Forage Fish (LFF)**
Very Tolerant Aquatic Life • Very Tolerant Macroinvertebrate Waters • No Fully Aquatic Life Waters	**VTAL** • VTAL-M • VTAL-NA	**Limited Aquatic Life (LAL)**

PART A. Guidelines Overview

1. BACKGROUND

The Wisconsin Department of Natural Resources (the Department) is responsible for protecting, maintaining, improving and managing the state's waters – both surface and groundwater. The Wisconsin Statutes provide the Department with the authority to regulate and manage how waters are used to ensure the protection of water quality and the general public interest in Wisconsin's waters (See Section 1.01, below).

This document focuses solely on Department efforts to classify surface waters that display varied characteristics in flow, gradient, substrate type, depth, water quality, etc. Due to natural differences in these physical and chemical characteristics, surface waters have the capacity to support a number of important **uses** including, but not limited to:

- the ability to supply water for commercial interests and human consumption
- the ability to sustain viable communities of fish and other aquatic life
- the ability to sustain viable communities of water-dependent wildlife
- the ability to provide for human recreational activities

The Department recognizes that not all surface waters can attain each of those uses. In fulfilling its goal to protect, maintain, and improve surface waters, however, the Department must classify the state's waters based on **attainable** uses. Those uses – once promulgated in the Wisconsin Administrative Code – form the foundation for water quality protection by identifying the water quality goals the Department strives to reach through its statewide and local management actions.

Formal guidelines for designating fish and aquatic life uses in Wisconsin's surface waters were first developed in 1982 and included in a document titled, *Stream Classification Guidelines For Wisconsin* (Ball 1982). The 1982 guidelines were designed as a point source management tool to qualitatively assess and designate fish and aquatic life uses for surface waters that received waste discharges from treatment plants operating under a Wisconsin Pollutant Discharge Elimination System permit. The guidelines allowed the implementation of the then-evolving concept that surface water use designation should be based on their ability to **attain** to support a specific aquatic community rather than on the **existing** community. The guidelines provided a way to determine attainable uses based on a stream's natural capacity to attain a certain fish and aquatic life use. The 1982 guidelines placed the emphasis on potential because at that time many streams, especially small streams, were not fully attaining their uses due to point source pollution. The implementation of the 1982 procedures advanced the potential use concept, increased recognition of the environmental value of small streams, and highlighted the need for better management of all pollutant sources so that potential uses could be attained.

In recent years other reasons for classifying surface waters have evolved, such as managing agricultural and stormwater runoff. This document updates and revises the original guidelines to address a wider range of environmental issues, and to account for the environmental relationships between permitted discharges and other pollutant sources. The revisions are based upon many years of experience by Department staff and improve the effectiveness of the use designation process in meeting a much wider range of environmental program needs than those that were developed in 1982.

It is very important to note that these guidelines apply **only** to fish and aquatic life communities and not to other use designations identified in Ch. NR 102, Wis. Adm. Code (e.g. wildlife, recreational use, etc). While the procedures described in this document are designed primarily for flowing streams, the basic procedures

can be applied to any surface water – including lakes, impoundments and wetlands – to establish use designations that identify water quality management goals.

1.01 LEGISLATIVE MANDATE AND AUTHORITIES

Chapter 281, Stats., establishes the Department "as the central unit of state government to protect, maintain and improve the quality and management of the waters of the state, ground and surface, public and private," and gives the Department "general supervision and control over the waters of the state." The term "waters of the state" is defined in s. 281.01(18), Stats., as:

> ***"Waters of the State"*** *includes those portions of Lake Michigan and Lake Superior with the boundaries of this state, and all lakes, bays, rivers, streams, springs, ponds, wells, impounding reservoirs, marshes, watercourses, drainage systems and other surface water or groundwater, natural or artificial, public or private, within this state or its jurisdiction."*

Chapter 281, Stats., further directs and authorizes the Department to maintain a "comprehensive action program directed at all present and potential sources of pollution … to protect human life and health, fish and aquatic life, scenic and ecological values, and domestic, municipal, recreational, industrial, agricultural and other uses of water." In order to meet this obligation, the Department is charged with setting water quality standards that "recognize(s) that different standards may be required for different waters or portions thereof." Specifically, s. 281.15, Stats., requires that "Water quality standards shall protect the public interest, which include the protection of the public health and welfare and the present and **prospective future use** of such waters for public and private water systems, propagation of fish and aquatic life and wildlife, domestic and recreational purposes and agricultural, commercial, industrial and other legitimate uses. In all cases where the **attainable uses** of water are in conflict, water quality standards shall be interpreted to protect the general public interest*."*[emphasis added]

In exercising this statutory authority, the Department establishes water quality standards for individual surface waters based on the potential or **attainable** uses of the water. This mandate also clearly applies to all waters of the State whether they are natural or artificially created. In addition to state statutory requirements, the Department is required by the Federal Clean Water Act (PL92-500) to "provide, **wherever attainable**, water quality for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water." [emphasis added]. Wisconsin has interpreted the wherever attainable clause to mean that all surface waters in the State shall meet the water quality standards associated with the proposed Diverse Fish and Aquatic Life (DFAL) use sub-category.

In practice, this means that all surface waters are designated DFAL until an evaluation of the surface water shows that either:

- A DFAL use is not attainable due to natural limitations that prevent the water from supporting a DFAL community, or
- The water segment is capable of supporting a Coldwater community, or
- Irreversible conditions exist in a water segment that prevents the **DFAL** use from being attained.

In any case, the Department must provide the public with an opportunity to review the reasons cited for assigning a use designation other than DFAL and must promulgate any such difference in Ch. NR 104 (Wis. Adm. Code) for an alternate use sub-category to become effective.

Federal water quality standards regulations (40 CFR 131) make a clear distinction between existing uses and designated uses. **Existing uses** are those uses currently being attained in a water body. **Designated uses** are those uses specified in water quality standards for each water body whether or not the designated use is being attained. "At a minimum, uses are deemed attainable if they can be achieved by the imposition of effluent limits required under sections 301(b) and 306 of the Act and cost-effective and reasonable best management practices for nonpoint source control." (40 CFR 131.10)

The Department thus interprets state and federal regulations to mean that use designations must be based on attainable uses, not necessarily on existing uses. The Department has applied these designations based on **attainable** uses since stream classification guidelines were developed in 1982. The Department demonstrated a vision for large streams based on attainable use dating back to the 1960s through stringent water quality-based effluent limitations included in wastewater discharge permits at a time when only categorical limitations were required. This progressive approach to protecting water quality on rivers such as the Wisconsin River and Lower Fox River took aim at existing water quality that supported very poor fish communities with very little diversity and instead sought to rate their potential.

Some use designation procedures are based only on existing conditions (e.g., fish communities, habitat, trophic state). Existing conditions and aquatic communities may be a function of chemical or physical impacts that can be controlled, not a function of a potential to attain a more desirable or sensitive use. According to Warren (1979), "classification of stream systems ought not to be based directly on just measurement of stream performance, for then it would have little value for prediction, explanation, understanding and management." Warren recommended that stream classification systems should be based on "watershed--environment and stream habitat--capacity," not just on the aquatic communities inhabiting a stream when it is classified. The *Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Waters* provides guidance on assessing the existing conditions in surface waters and on how to determine naturally attainable fish and aquatic life communities.

2. PROCEDURE SUMMARY

Fish and aquatic life use designations are assigned to surface waters after those waters are evaluated using various assessment techniques. Data are interpreted considering a multitude of factors associated with the surrounding aquatic ecosystem. The procedures described in Part B detail the factors that commonly need to be evaluated and provide guidance on how to merge data and professional judgments into final decisions about appropriate use designations.

The fish and aquatic life communities found in surface waters are dependent upon the relationship and overall quality of ecosystem components. The most limiting ecosystem component generally controls the type of fish community and other aquatic life that can be supported by any particular surface water. Establishing a proper use designation requires field staff to evaluate the system to identify appropriate biological goals based on a water body's potential or attainability. An extremely important part of that decision is determining which of the factors that affect the achievement of those goals are controllable or non-controllable.

The use designation procedure relies on ecological data to the extent possible. In many situations professional judgment combined with historic and current data are required to designate an appropriate use. Objectivity in the procedure comes from evaluating similar factors, using sound and consistent monitoring procedures, and by consistently applying ecological criteria which separate the use into sub-categories. Because ecosystems are extremely complex, professional judgment must be part of the use designation process. To achieve consistency, the procedure requires that data are collected and interpreted by experienced biologists – preferably by biologists experienced in collecting and interpreting fish community and other ecological information in surface waters of similar size and type in the same geographic area. The guidelines in Part B cannot cover all possible situations and should be considered a starting point from which experience and sequentially collected data will dictate the scope of an evaluation, including when enough data have been collected, and when additional data need to be collected.

Assigning an appropriate designated use for a water body involves identifying:

- Relevant ecosystem components, including the existing fish and aquatic life community, and
- Which system component(s), if any, might limit the water body's potential to attain a more pollution intolerant or diverse fish and aquatic life community.

The minimum biological attributes of fish and aquatic life use sub-categories are described in Part B. The use of reference sites – similar **least-impacted** surface waters in a geographic area – is recommended to help determine appropriate use designations, especially when there is a need to identify **controllable** and **uncontrollable** use impairments.

To finalize the use designation process, the investigating biologist prepares a report to document her/his findings and offers a recommendation on the appropriate designated use. This report includes all field data and associated interpretations and is submitted to designated regional managers for review and finally to the Water Quality Standards Section Chief for tentative approval. The recommended use is then included in any submission to Department administrators and the Natural Resources Board along with known interested parties outside of the Department. With the exception of waters recommended for DFAL use designation, action must be taken to formally promulgate a use designation for any CW-A, CW-B, TFAL, or VTAL water before the use designation can become effective.

In summary, designating a fish and aquatic life use is one of the first steps in managing water quality. It is intended to be a scientific process that only looks at the resource and its natural characteristics and potential. Combining a use designation with specific numeric and/or narrative criteria, the Department manages a surface

water community in an effort to protect, maintain, and improve water quality, and tend to the statutory obligation to protect the interests of the public.

3. FISH & AQUATIC LIFE SUB-CATEGORIES

Wisconsin's fish and aquatic life use sub-categories are codified in Administrative Code NR 102.04(3) (Wis. Adm. Code). In this document, sub-categories are further broken down into sub-classes based upon biological, chemical, and/or physical conditions.

Specific guidance for collecting the data needed and the interpretation methods available for recommending an appropriate sub-category and sub-class for fish and aquatic life uses designations occurs in Part B. Surface water assessments using these guidelines can be applied to environmental management and regulatory programs that need biological, chemical, and physical information when evaluating and documenting the status of existing and attainable fish and aquatic life communities in surface waters.

3.01 SURFACE WATER USE CATEGORIES

Surface water use categories and sub-categories were developed so both narrative and numeric water quality criteria can be assigned to protect waters by recognizing their different designated uses. Beyond designating use categories/subcategories and adopting associated water quality criteria, the Department is also obligated to a policy of "anti-degradation" that states that actions will not be authorized that result in a lowering of existing water quality. This triad of management actions – designated uses, water quality criteria, and an anti-degradation policy – form what is referred to as Wisconsin's Water Quality Standards. Collectively, these standards are found in Chapters NR 102, 103, 104, and NR 105 of the Wisconsin Administrative Code.

As a foundation for those standards, s. NR 102.04 (Wis. Adm. Code) identifies the following specific categories of standards for the State's surface waters:

- Fish and Aquatic Life Use
- Recreational Use
- Public Health and Welfare
- Wildlife

Surface waters may serve many purposes and therefore water quality standards may be applicable to protect more than one use. For example, Lake Michigan and Lake Superior waters are recognized for their very diverse fish and aquatic life communities, but they also serve as the primary source of drinking water for many coastal communities and they are the foundation for many unique recreational opportunities for residents and tourists alike.

The Fish and Aquatic Life category contains many sub-categories in order to differentiate the range of sensitivities among Wisconsin's varied aquatic ecosystems. Additionally, within each sub-category further definition is articulated in sub-classes. These sub-classes do not change the applicable water quality criteria, but rather aid in more distinct categorization of the continuum of aquatic ecosystems found in Wisconsin.

Fish and Aquatic Life use sub-categories and sub-classes include:

3.02 COLDWATER-A (CW-A)

CW-A waters are coldwater ecosystems that support, or have the potential to support salmonid species that are fully or partially maintained by natural reproduction. These systems also have the potential to sustain stenothermal coldwater communities. Sub-classes associated with the CW-A sub-category include:

3.02(1) **Class I Trout Waters (CW-A - Class I)**

3.02(2) **Class II Trout Waters (CW-A - Class IIn)**

3.02(3) **Coldwater-a (CW-A -CW)**

3.03 COLDWATER-B (CW-B)

CW-B waters are coldwater ecosystems that do not have the potential for salmonid reproduction, but could potentially contain salmonid species if maintained by stocking, or a community of migratory salmonid species. It is also common to find non-salmonid stenothermal coldwater species in CW-B waters. Sub-classes associated with the CW-B sub-category include:

3.03(1) **Class II Trout Waters (CW-B - Class IIx)**

3.03(2) **Class III Trout Waters (CW-B - Class III)**

3.03(3) **Salmonid Migratory Waters (CW-B - MIG)**

3.03(4) **Coldwater-b (CW-B - CW)**

3.04 DIVERSE FISH & AQUATIC LIFE (DFAL)

DFAL surface waters are generally warm and coolwater ecosystems with the potential to contain fish and macroinvertebrate communities that include some species relatively intolerant of low dissolved oxygen levels. This use designation encompasses a large range of aquatic communities, habitats, and ecosystem types as noted by the sub-classes identified below. While the Department recognizes several sub-classes associated with this use designation, there are no differences in the applicable water quality criteria. All Wisconsin surface waters are classified DFAL by default unless a water has been specifically assigned to a use in Chapters NR 102 or NR 104 (Wis. Adm. Code). Sub-classes associated with the DFAL sub-category include:

3.04(1) **Game Fish Waters (DFAL-GF)**

3.04(2) **Non-Game Fish Waters (DFAL-NG)**

3.04(3) **Macroinvertebrate Waters (DFAL-MC)**

3.04(4) **Endangered, Threatened or Special Concern Species Waters (DFAL-ETSC)**

3.04(5) **Intolerant Fish Species Waters (DFAL-IF)**

3.04(6) **Coolwater Fish Species Waters (DFAL-CC)**

3.05 TOLERANT FISH & AQUATIC LIFE (TFAL)

Tolerant fish and aquatic life surface water ecosystems have the potential to support fish and macroinvertebrate species that are relatively tolerant to low dissolved oxygen concentrations. Sub-classes associated with the TFAL sub-category include:

3.05(1) **Tolerant Fish Waters (TFAL-F)**

3.05(2) **Tolerant Macroinvertebrate Waters (TFAL-M)**

3.06 VERY TOLERANT AQUATIC LIFE (VTAL)

Very tolerant aquatic life ecosystems do not have the potential to maintain a fish community and have either limited natural capacity or irretrievable water quality conditions that prevent them from fully supporting aquatic life forms. These waters may contain macroinvertebrate communities dominated by species that are very tolerant of low levels of dissolved oxygen. Some VTAL waters may briefly contain a few stray fish during high-flow periods when water quality and habitat conditions allow for their existence. Waters that routinely contain seasonal fish communities should generally be classified as seasonal use surface waters with the appropriate use designation. Sub-classes associated with the VTAL sub-category include:

3.06(1) **Very Tolerant Macroinvertebrate Waters (VTAL-M)**

3.06(2) **No Fully Aquatic Life Waters (VTAL-NA)**

4. SPECIAL CONDITIONS

All Wisconsin surface waters must be associated with at least one of the uses previously described in Section 3. There are, however, special conditions that apply when deriving or applying some of the use designations. In some cases, additional labels exist that may be assigned to a water segment to guide the Department's management activities to achieve the goals of the Clean Water Act discussed in Section 1. Special conditions include:

4.01 DEFAULT USE DESIGNATION

In the absence of a formal use designation report and promulgation in Ch. NR 104 (Wis. Adm. Code) -- which requires an opportunity for public review, Natural Resources Board approval, and adoption by the Wisconsin Legislature – the state's surface waters are regulated using the Diverse Fish and Aquatic Life use designation. Therefore, the default designated use for surface waters is DFAL and it is applied to all waters that have not been formally classified as either Coldwater-A, Coldwater-B, TFAL, or VTAL unless explicitly stated elsewhere in the Wisconsin Administrative Rules.

4.02 SPECIAL RESTRICTIONS FOR TOLERANT AND VERY TOLERANT FISH & AQUATIC LIFE DESIGNATED USES

Surface waters assigned the designated use of either Tolerant Fish and Aquatic Life (TFAL) or Very Tolerant Aquatic Life (VTAL) require promulgation in Ch NR 104 of the Wisconsin Administrative Code after a use attainability analysis establishes that the water body cannot attain a full fish and aquatic life use. In general, a TFAL or VTAL use designation recognizes that those waters may never achieve CW or DFAL status due to **natural or irretrievable** habitat or water quality limitations. The criteria that water quality managers apply in the use attainability analysis are described in Part B Section 2.05. The ability to designate uses other than Fish and Aquatic Life waters is found in the Clean Water Act and the authority is written in s. 283.15(4), Stats.

4.03 GREAT LAKES WATERS

"Great Lakes system" waters are defined in s. NR 102.12 (Wis. Adm. Code) for the purpose of regulating the discharge of persistent, bioaccumulative toxic substances. These are surface water bodies or segments thereof that are within the drainage basin of the Great Lakes. The regulation of other substances in these waters is based on all other classified uses for these water bodies, including the fish and aquatic life use sub-categories designated year round or seasonally.

4.04 WETLANDS

The Department is evaluating options for creating wetland-specific Use Designations and associated water quality criteria. Wetlands would be assessed and designated uses promulgated under NR103. Meanwhile, (and probably even after these additional procedures are developed) wetlands default into the VTAL designation, unless staff determines that classification into a different subcategory of the fish and aquatic life designated use is appropriate.

Wetlands can support aquatic communities in any of the fish and aquatic life use sub-categories listed in Section 2. Some wetlands contain habitat and water quality sufficient to support a fish community year round or seasonally. For example, some wetlands are used by spawning northern pike in the spring, but water quality or habitat is not sufficient to sustain these species at other times. Seasonal uses (Section 4.05) should be applied to these surface waters to assure that more sensitive seasonal uses are protected.

4.05 SEASONALLY PROTECTED WATERS

A surface water can be assigned use designations based on seasonal differences in fish and aquatic life use. This situation most typically occurs in the spring when stream flows are high, allowing for migratory species to temporarily occupy the water body. Seasonal use designations allow water quality protection associated with more sensitive fish and aquatic life uses. A seasonal use designation must include the fish and aquatic life use and the circumstances for each use. Typical seasonal use situations include:

- Great Lakes tributaries or inland streams with seasonal migratory salmonid communities.
- Wetlands or other waters that support warm water game fish reproduction in the spring, but are not inhabited by these species at other times due to natural habitat or water quality limitations.
- Small streams that support non-game fish reproduction or communities seasonally, but not year round due to natural habitat or water quality limitations.

4.06 OUTSTANDING AND EXCEPTIONAL RESOURCE WATERS

For the purpose of the anti-degradation policy to prevent the lowering of existing water quality, some waters are classified as outstanding or exceptional resource waters. These waters, listed in NR102.10 and NR102.11, are deemed to have significant value such as valuable fisheries, hydrologically or geographically unique features, outstanding recreational opportunities, unique environmental settings, and are not significantly impacted by human activities. Any discharge that may be allowed to these waters can generally not be above background levels. These waters are considered "areas of special natural resource interest" for permitted activities under Ch. 30, Wis. Adm. Code. The guidance and procedure for designating Outstanding and Exceptional Resource Waters are separate from that used for designating Fish and Aquatic Life uses.

4.07 TWO-STORY FISHERY

A two-story fishery is a warmwater lake that predominately supports a warmwater fish community, but also supports a coldwater fish community in deeper water. Most of these lakes are deep and maintain water temperatures and sufficient oxygen at depth to meet the requirements of salmonid species. Typically these lakes contain lake trout or cisco. Examples include Lake Mendota in Dane County that contains cisco, and Big Green Lake in Green Lake County that contains lake trout.

Two-story fishery is not a formally recognized use designation in the Wisconsin Administrative Rules. Therefore, it should not be listed as a classification or use designation in State of the Basin Reports or other applicable documents. In most cases the appropriate use designation for these lakes is DFAL because the fishery is dominated by warmwater species. In a situation where the water quality criteria for the DFAL use designation are not adequate to protect the coldwater community at depth, site-specific criteria can be developed to protect that resource.

5. ENVIRONMENTAL FACTORS

A multitude of factors can affect water quality for a given stream or lake and the controllability of those factors weighs heavily upon the final recommendation for a water body's attainable use.

The Clean Water Act recognizes that some of the factors affecting water quality – both natural and cultural - are **uncontrollable** and management actions would not restore such waters to a state of biological integrity. On the other hand, when factors influencing water quality are **controllable,** the Clean Water Act recognizes that those factors are temporary and likely to respond to appropriate management actions. Where controllable factors and their effects can be identified, the Department must assign a use designation for the use the water body would be expected to attain if those water quality impacts are abated. Common natural and cultural factors that impact surface water uses and their controllability are listed in Part B, Table 2.

In assessing controllability Department staff need to be familiar with the environmental conditions usually associated with the various fish and aquatic life use sub-categories. Chemical and physical water body characteristics associated with the sub-categories and procedures for evaluating them are described in Part B. These surface water characteristics include the existing fish and aquatic life community, habitat, dissolved oxygen, temperature, pH, and toxic substances. Ambient numeric water quality criteria specific to each fish and aquatic life sub-category for all substances are found in NR 102 and NR 105 (Wis. Adm. Code).

While this guidance document encourages objectivity in the use designation process, professional experience and judgment are very important when making a final use designation recommendation. Since the decision of attainable use is so dependent upon the issue of controllability, it is very important to understand the difference between natural and cultural impacts to a watershed and surface water.

5.01 NATURAL

Since most surface waters in Wisconsin have been disturbed by human activity it is difficult to define a totally natural factor. For use designation purposes, natural factors are defined as an aquatic ecosystem's physical and chemical characteristics in the absence of controllable cultural impacts. Important natural factors include:

5.01(1) **WATER VOLUME –** Water quantity is key to the number and species of aquatic organisms that can live in a water body. Large fish survival generally depends upon more and deeper water than for small fish. Inadequate flow and water depth could limit large fish in feeding, reproduction, and predator evasion. Game fish species such as small mouth bass, juvenile northern pike or juvenile largemouth bass may, however, occur in relatively small streams with low flow and shallow water when adequate habitat and water quality exists. Trout may be found in small cold water systems with good habitat and water quality**.** In some streams, flow stability or frequency also becomes an important factor. Flow extremes can be a major factor in determining appropriate designated uses, especially in streams running through culturally altered watersheds.

5.01(2) **HABITAT STRUCTURE -** The interaction between the physical structure of a stream and the water in it often determines the type of aquatic life community it can support. Substrate type, pools and riffles, water depth, erosion and deposition areas, water velocity and cover create the diverse habitat needed to support the wide variety of species that make up specific aquatic communities. Studies by Gorman and Karr (1978) clearly show that diverse habitats support more abundant and diverse aquatic communities in warm water systems. Studies by Hunt (1971) show that better habitat in cold water systems will support larger trout communities**.** Surface waters with limited habitat structure generally cannot support large populations or diverse fish and aquatic life communities. Limited habitat in cold

water systems can, however, result in more diverse fish communities due to low trout numbers and less predation.

5.01(3) **WATER QUALITY -** The physical and chemical characteristics of general importance to fish and aquatic life in surface waters include dissolved oxygen, temperature, suspended solids, dissolved ions and nutrients. These parameters can directly affect the ability of a surface water to support certain fish and other aquatic life species. Water quality extremes are particularly important. Deviations from water quality criteria, even for a short time, may stress sensitive aquatic communities beyond recovery. Natural water quality is influenced by watershed geology, soils, surface features and climate. Flow regime, depth and aquatic habitat structure may also influence water quality.

5.02 CULTURAL FACTORS

Cultural factors are human activities on the land and in the water that may affect water and/or habitat quality and ultimately both the assignment of a fish and aquatic life use and a stream's ability to achieve that use. Cultural factors are broadly defined as point and nonpoint source pollution, but also include habitat modifications such as permitted maintenance dredging and dams. Nearly all waters of the state have been disturbed by human activity, some more significantly than others.

Cultural factors and their effects on water quality and habitat can be further divided into controllable and uncontrollable types, or similarly, reversible and irreversible effects or impacts. Cultural impacts that fall under the State's regulatory authority, or that fall under ongoing environmental management program efforts are generally considered controllable for use designation purposes. In some cases, however, the actions required to abate or restore cultural impacts may not be possible or likely to occur. Some cultural factors may be considered uncontrollable because they cannot, or are unlikely to be managed in the foreseeable future and, for all practical purposes, become irreversible surface water characteristics due to cultural, social, or other institutional reasons.

5.03 NEED TO ASSESS CONTROLLABILITY

The guidance provided in Part B Section 3.02 on interpreting pollutant source controllability is based on the following programs and policies:

5.03(1) **Various State and Federal rules and regulations** require permits and other authorizations to discharge pollutants and conduct activities in surface waters. These authorizations generally require maintaining water quality standards that are based on use designations and the water quality criteria necessary to attain the uses. The issuance of National Pollution Discharge Elimination System (NPDES) Permits to point source dischargers is an example of this type of regulation.

5.03(2) **The Nonpoint Source Pollution Abatement Program (chs. NR 120, NR 153, NR 154, NR 155, Wis. Adm. Code)** codifies how three Runoff Management grant programs operate and lists best management practices (BMPs) that can be implemented. The three grant programs include the Priority Watershed and Priority Lake Program, the Targeted Runoff Management Grant Program, and the Urban Nonpoint Source and Storm Water Management Grant Program. In addition, ss. 281.65 and 281.66 Wis. Stats., authorize the grant programs with the goal to eventually manage nonpoint sources in all watersheds in the state that have nonpoint source pollution problems. The intent of this legislation, and the runoff management program, is to control nonpoint sources to achieve attainable water quality goals. Surface water designated uses should reflect naturally attainable uses taking into account the controllable nonpoint source impacts that may contribute to not attaining designated uses.

PART B.
Data Collection & Interpretation Procedures

1. FISH AND AQUATIC LIFE USE SUB-CATEGORIES – GENERAL

The following sub-categories of the Fish and Aquatic Life use designation are currently included in s. NR 102.04 (Wis. Adm. Code).

Applicable Rule Reference	Current Common Acronym
s. NR 102.04(3)(a) Cold Water Communities	CW
s. NR 102.04(3)(b) Warm Water Sport Fish Communities	WWSF
s. NR 102.04(3)(c) Warm Water Forage Fish Communities	WWFF
s. NR 102.04(3)(d) Limited Forage Fish Communities	LFF
s. NR 102.04(3)(e) Limited Aquatic Life Communities	LAL

The Department proposes using the authority provided in Chapter 227, Stats., to revise NR 102 (Wis. Adm. Code), resulting in changes to the current sub-categories identified above. The guidance provided in this document will refer to the **proposed** names of those sub-categories as presented in the Table 1.

Table 1. Proposed and Current Fish and Aquatic Life Use Sub-categories and Sub-classes.

Proposed Fish Aquatic Life Sub-Category and Associated Sub-Class	Proposed Acronym	Current Sub-Category as Listed in Wisconsin Administrative Code
Coldwater A • Class I Trout Waters • Class II Trout Water • Coldwater-a	**CW-A** • CW-A – Class I • CW-A – Class IIn • CW-A – CW	**Cold Water**
Coldwater B • Class II Trout Waters • Class III Trout Water • Salmonid Migratory Waters • Coldwater-b	**CW-B** • CW-B – Class IIx • CW-B – Class III • CW-B – MIG • CW-B – CW	**Cold Water**
Diverse Fish & Aquatic Life • Game Fish Waters • Non-Game Fish Waters • Macrointertebrate Waters • Endangered, Threatened or Special Concern Species Waters • Intolerant Fish Species Waters • Coolwater Fish Species Waters	**DFAL** • DFAL-GF • DFAL-NG • DFAL-MC • DFAL-ETSC • DFAL-IF • DFAL-CC	**Warm Water Sport Fish (WWSF)** **Warm Water Forage Fish (WWFF)**
Tolerant Fish & Aquatic Life • Tolerant Fish Waters • Tolerant Macroinvertebrate Waters	**TFAL** • TFAL-F • TFAL-M	**Limited Forage Fish (LFF)**
Very Tolerant Aquatic Life • Very Tolerant Macroinvertebrate Waters • No Fully Aquatic Life Waters	**VTAL** • VTAL-M • VTAL-NA	**Limited Aquatic Life (LAL)**

2. SUB-CATEGORY DESCRIPTIONS

The proposed use sub-categories and associated sub-classes, described below, reflect fish and aquatic life communities with relatively distinct characteristics, including:

- fish or other aquatic life species present,
- number of fish,
- number of fish species,
- temperature tolerance of fish species,
- the capacity of species to complete their life cycles, and
- recognition that different communities are found in surface waters with different water quality or habitat characteristics.

These differences in water quality and habitat can be measured or predicted and, using data on the existing community, comparisons to reference sites, and professional judgment form the basis for designating attainable fish and aquatic life uses for surface waters. Refer to Appendix 1 for a complete listing of fish species found in Wisconsin waters as of 2001.

The communities described generally are based on the minimum expectations for defining use sub-category attainment under normal annual low flow or seasonal conditions (See Appendix 2). Some fish species are indicators of existing habitat and water quality conditions (See Appendix 3.).

Federal regulations require that the most sensitive use attained in surface water at anytime since November 28, 1975 is the attainable and designated use (40 CFR 131.3, Water Quality Standards). This use cannot generally be changed to a less sensitive use designation unless an approved water quality standards review shows the more sensitive use is no longer attainable. This federal regulation applies to all use designations.

2.01 COLDWATER COMMUNITIES

A coldwater community may support a salmonid community composed of one or more salmonid species in one or more age groups even if no other fish species are present in a surface water. The number of salmonids per 100 meter stream length will vary depending on stream size and habitat quality. Salmonid species do not need to dominate the fish community to be defined as a coldwater community. Generally more than two salmonids per 100 meter stream length would qualify as a coldwater community. Finding a few salmonids in a surface water, however, may or may not indicate the potential to support a CW use. Salmonid presence in the absence of other cold water indicators could be incidental and related to a variety of causes such as accidental introduction from a hatchery. Inland streams supporting low numbers of migratory brown trout and few or none of other coldwater indicator species may not represent a true coldwater habitat. Factors such as seasonal conditions, extreme water temperatures, habitat and water quality, and professional judgment must be used to help make a decision about an appropriate use. Often, mottled sculpin, slimy sculpin, or American brook lamprey will be found in a stream that is representative of a true coldwater community and ecosystem.

2.02 COLDWATER-A (CW-A):

CW-A waters are coldwater ecosystems that support or have the potential to support salmonid species that are fully or partially maintained by natural reproduction. These systems also have the potential to sustain a salmonid community containing more than one age group above the age of 1 year, or serve as a spawning or nursery area for age 0-1 year salmonids. The CW-A designated use includes the highest quality cold

surface waters in the State. These waters are identified as Class I and Class II-n (n indicates natural reproduction) Trout Waters in *Wisconsin Trout Streams*, Publication 6-3600(80).

Coldwater-A waters generally have the following habitat and water quality characteristics:

- **GENERAL:** CW-A waters will typically maintain good water quality, and contain good to excellent habitat sufficient to support a community of naturally reproduced salmonids or coldwater indicator species. A CW-A designated use can be applied *seasonally* where salmonids could spawn successfully, but more than one age group cannot be supported due to habitat limitations. Additional information regarding seasonal use designation is provided in Part A Section 4.05.

- **HABITAT/FLOW:** Surface waters with the potential to contain salmonid species can range in flow from less than 0.2 cubic feet per second to the largest trout stream in the state. Stream flow will generally be continuous and stable due to groundwater.

- **TEMPERATURE:** An important factor in designating this use is the potential maximum daily mean temperature of approximately 22°C (72°F) and an instantaneous maximum temperature of approximately 25°C (77°F). In addition, CW-A streams will generally not completely freeze over in winter due to groundwater inputs that maintain stream temperatures above freezing. Some aquatic invertebrates and plant species, such as true watercress *(Rorippa nasturtium-aquaticum)* may indicate cold water conditions.

- **DISSOLVED OXYGEN:** Dissolved oxygen levels will generally be 6 mg/L or greater. During spring and fall spawning and incubation periods the dissolved oxygen will generally be 7 mg/L or greater.

The following Coldwater-A Sub-Classes have been identified for Wisconsin:

2.02(1) **Class I Trout Waters (CW-A - Class I):** This sub-class applies to coldwater ecosystems capable of attaining a self-sustaining salmonid community. These waters contain areas of gravel, small rubble or coarse sand capable of infiltration by groundwater or flow of sufficient quantity and quality to allow successful hatching of salmonid eggs, and fry emergence. These waters are capable of supporting salmonids in two or more age groups above the age of 1 year and survival of wild salmonids in sufficient numbers to utilize all available habitat and sustain a fishery without stocking. Most Class I Trout Waters are also designated Outstanding or Exceptional Resource Waters (Listed in Ch NR 102.10-11).

2.02(2) **Class II Trout Waters (CW-A - Class IIn):** This sub-class applies to coldwater ecosystems capable of attaining a salmonid community with one or more age groups above the age of 1 year, in sufficient numbers to indicate substantial survival from one year to the next. These streams also contain habitat and water quality adequate for natural reproduction, but some stocking is necessary to fully utilize all available habitat or to sustain a fishery. Several Class II Trout Waters are also designated Exceptional Resource Waters and some are designated Outstanding Resource Waters (Listed in Ch NR 102.10-11).

2.02(3) **Coldwater-a (CW-A - CW):** This sub-class applies to coldwater ecosystems that may not contain salmonids or may not currently be classified as trout water. These ecosystems have the potential to support salmonid spawning or embryonic development, and contain or have the potential to contain other stenothermal coldwater indicator species (Appendix 3.C). A fish community containing approximately 40 percent or more individual coldwater indicator species and having a cold water index of biotic integrity (IBI) score (Lyons et al., 1996) of 30 or greater indicates that a Coldwater-A use exists, even in the absence of salmonid species. When any coldwater indicator species is present, along with habitat and water quality suitable for salmonid spawning or young of the year rearing, the CW-A use designation may be justified based on potential.

These tend to be small systems that may be biologically subject to destruction by even minor water quality or habitat alterations. Introducing salmonids to these systems may threaten other species and may not be the preferred mode of management. The use designation report should address this issue and recommend a preferred biological management action.

2.03 **COLDWATER B (CW-B):**

CW-B waters are coldwater ecosystems with no potential for salmonid reproduction, but that could contain salmonid species maintained by stocking, or a community of migratory salmonid species. These waters are identified as Class II-x (x indicates stocked) and Class III Trout Waters in *Wisconsin Trout Streams*, publication 6-3600(80).

Coldwater-B waters generally have the following habitat and water quality characteristics:

- **GENERAL:** CW-B waters will typically maintain good water quality, and contain fair to excellent habitat sufficient to support a community of salmonids or other coldwater indicator species. The CW-B designated use can be applied seasonally as defined in Part A Section 4.05.

- **HABITAT/FLOW:** The size range of CW-B streams is the same as CW-A streams, with the exception that some large streams tributary to the Great Lakes may meet criteria for a CW-B designated use at least seasonally.

- **TEMPERATURE:** An important factor in designating this use is the potential maximum daily mean temperature of approximately 22^{o}C (72^{o}F) and an instantaneous maximum temperature of approximately 25^{o}C (77^{o}F). In addition, CW-B streams will generally not completely freeze over in winter due to groundwater inputs that maintain stream temperatures above freezing. Some aquatic invertebrates and plant species, such as true watercress *(Rorippa nasturtium-aquaticum)* may indicate cold water conditions.

- **DISSOLVED OXYGEN:** The dissolved oxygen and temperature characteristics will also be similar to CW-A waters, except that dissolved oxygen will be at least 6 mg/L.

The following Coldwater-B Sub-Classes have been identified for Wisconsin:

2.03(1) **Class II Trout Waters (CW-B - Class IIx):** This sub-class applies to coldwater ecosystems that do not contain habitat or water quality suitable for salmonid reproduction. A salmonid fishery is maintained by periodic stocking. These waters support a salmonid community with one or more age groups above the age of 1 year, in sufficient numbers to indicate substantial annual survival.

2.03(2) **Class III Trout Waters (CW-B - Class III):** This sub-class applies to coldwater ecosystems capable of supporting stocked salmonids during the fishing season, but may not contain habitat or water quality suitable for salmonid survival year round. These waters do not support natural salmonid reproduction, and require annual stocking of legal size fish to provide a sport fishery.

2.03(3) **Salmonid Migratory Waters (CW-B - MIG):** This sub-class applies to cold, cool or warmwater ecosystems containing salmonid species year round or seasonally that have migrated into the surface water from a water body with a permanent salmonid community**.** Surface waters containing migratory salmonid communities may be designated CW-B waters year round when salmonid species are present year round, and may be designated CW-B waters seasonally when salmonid species are only present at certain times during the year. Local fisheries staff can provide the time periods when salmonids are

commonly expected to be present. Migratory salmonid communities commonly occur in Great Lakes tributaries and other connected waters, but can also occur in other surface waters. These waters do not contain habitat or water quality adequate for successful salmonid reproduction.

2.03(4) **Coldwater-b (CW-B - CW):** These are coldwater ecosystems that may not contain salmonids or may not currently be classified as trout water. These ecosystems do not contain habitat or water quality suitable for salmonid spawning or embryonic development. They generally contain other stenothermal coldwater indicator species (Appendix 3.C.) and have the potential to contain introduced or migratory salmonid adults or fingerlings. Waters not containing salmonids but containing approximately 10 percent or more stenothermal coldwater indicator fish species, and a cold water index of biotic integrity (IBI) score (Lyons et al., 1996) of 20 or greater indicates that a CW-B use exists. The presence of any coldwater species indicates the water may be a coldwater habitat with potential to support introduced or migratory salmonid species and justify a CW-B use designation.

These tend to be small systems that may be biologically subject to destruction by even minor water quality or habitat alterations. Introducing salmonids to these systems may threaten other species and may not be the preferred mode of management. The use designation report should indicate that introducing salmonids to these systems might be threatening.

2.04 DIVERSE FISH AND AQUATIC LIFE (DFAL):

DFAL surface waters are generally warmwater and coolwater ecosystems with the potential to contain fish and macroinvertebrate communities with some species that are relatively intolerant to low levels of dissolved oxygen. This use designation encompasses a large range of aquatic communities, habitats and ecosystem types. All DFAL surface waters require the same water quality criteria for protection. Fish species that are tolerant and intolerant to low dissolved oxygen levels, tolerant to habitat alterations, and cool water indicators are listed in Appendix 3. All Wisconsin surface waters are classified DFAL by **default** under the Clean Water Act until a CW-A, CW- B, TFAL or VTAL use sub-category is promulgated in the Wisconsin Administrative Code.

The community characteristics described below are minimally attainable expectations for a DFAL designated use. An existing community not meeting one of these expectations does not mean the surface water cannot be designated DFAL. Most streams with permanent flow have the potential to support a diverse aquatic community except where water quality or habitat is limited by uncontrollable factors. In addition, meeting one of these expectations does not infer that the water body is fully meeting its attainable use. With appropriate management, a DFAL community may contain more species or individuals. Full use attainment is always the goal and to reach it may require additional management actions.

The sub-classes Game Fish, Non-game Fish and Macroinvertebrate are mutually exclusive categories. The Endangered, Threatened or Special Concern Species, Intolerant Fish Species, and Coolwater Fish Species sub-classes are not mutually exclusive community types and could be included as additional sub-classes in the description of a fish and aquatic life use for the water body.

Fish presence does not automatically confer a particular DFAL sub-class. The fish could be present as strays or as a result of such things as a pond wash out and would not normally be found there. Other factors should be considered such as the time of year, flow conditions, habitat and normal water quality. Professional judgment should be used to make decisions and justify appropriate designated uses.

<u>Diverse Fish and Aquatic Life waters generally have the following habitat and water quality characteristics</u>:

- **HABITAT/FLOW:** DFAL communities are found in all types of aquatic habitats, including significantly disturbed habitat conditions. Fish species known to be tolerant to disturbed habitat are listed in Appendix 3.B.

- **TEMPERATURE:** Summer maximum temperatures in warm DFAL surface waters will normally range from greater than 25°C (77°F) to a maximum of about 31° C (87°F). Temperatures routinely exceeding 31°C (87°F) in some waters or in extreme periods do not exclude a surface water from the DFAL use sub-category. Summer maximum temperatures in cool DFAL surface waters will normally range from about 22-25°C (72-77°F).

- **DISSOLVED OXYGEN:** The water quality criterion for dissolved oxygen for all DFAL waters is 5 mg/L. A separate coolwater use designation has not been developed due to insufficient data to support a DO standard different than 5 mg/L. Most surface waters with the potential to support non-salmonid fish species will be capable of maintaining dissolved oxygen near this concentration under most conditions. Dissolved oxygen levels in some surface waters may periodically fall below 5 mg/L, especially under low flow and high temperature conditions. Periodic dissolved oxygen concentrations less than 5 mg/L do not exclude a surface water from the DFAL use sub-category as long as the minimum species and population criteria can be attained and maintained at least seasonally.

The following Diverse Fish and Aquatic Life Sub-Classes have been identified for Wisconsin:

2.04(1) **Game Fish Waters (DFAL-GF):** This sub-class includes warm or cool water ecosystems containing, or having the potential to contain more than two game fish, of one or more species, excluding salmonids, green sunfish, black bullheads or yellow bullheads in a lake or in a 100-meter stream segment. Game fish species are defined as "all varieties of fish except rough fish and minnows," Sec. 29.001(41), Stats. In these guidelines the game fish green sunfish, black bullheads and yellow bullheads are excluded because they are considered tolerant to low levels of dissolved oxygen. For example, if a water body contained only black bullheads it would not be classified DFAL based on game fish. It might be classified TFAL based on the potential to support only tolerant fish and macroinvertebrate species.

The term community is also defined here as a community of aquatic organisms that can survive at a location year round or seasonally, even if conditions do not provide full life cycle requirements for all species within the community. The presence of more than two game fish can be an indicator that the DFAL-GF sub-class use may be attainable, however the presence of only a few game fish, particularly juveniles, may or may not justify a DFAL designated use.

Generally, game fish streams have continuous flows with low flows greater than one cubic foot per second. Game fish species are known to occur in smaller streams. Non-continuous streams that periodically contain feeding, reproducing or juvenile game fish can be seasonally designated DFAL. Most lakes and other standing waters in the state support game fish with the exception of some small and shallow water bodies with limited habitat or periodic natural water quality problems. Streams containing game fish generally maintain water quality and habitat at the annual minimum seven-day mean stream flow, based on two-year low flow (7Q2) sufficient to support at least a few game fish and a community of non-game fish species that meets the minimum expectations for a DFAL designated use.

Surface waters containing or having the potential to contain game fish communities are all classified DFAL waters for regulating water quality standards. For other purposes, such as fisheries management, fishing regulations, and public information, the specific game fish species and the dominant game fish species contained in a surface water may be significant and should be indicated as part of the Use Designation report.

2.04(2) **Non-game Fish Waters (DFAL-NG):** This sub-class applies most appropriately to warm water ecosystems capable of attaining a rough fish and minnow species community where 5 to 25 percent of the fish that may be present are intolerant to low dissolved oxygen [see Part B. Subsection 4.06(4)]. Non-game fish are defined and are listed as "minnows" in Sec. 29.001(54), Stats., and as "rough fish" in Sec. 29.001(74), Stats. Non-game fish community waters designated DFAL are generally small streams with continuous flow, or streams that maintain water in pools during dry periods. Non-continuous streams that can periodically meet the minimum community expectations can be designated as seasonal DFAL waters.

Meeting the non-game fish expectations as an existing condition would generally indicate the appropriate designated use as DFAL. However, under some conditions meeting the community expectations may not always justify the DFAL designated use, especially where only one to three species and a community of less than 50 fish per 100 meter stream length are found.

2.04(3) **Macroinvertebrate Waters (DFAL-MC):** This sub-class includes warm, cool and coldwater* ecosystems that may not contain habitat sufficient to support the minimum DFAL or Coldwater fish community expectations, but contain water quality and natural habitat sufficient to support macroinvertebrates not tolerant of low dissolved oxygen. This sub-class applies most appropriately to a stream with a macroinvertebrate community where 5 to 25 percent of the organisms present have Hilsenhoff Biotic Index (HBI) tolerance values less then or equal to 5 (Hilsenhoff 1987). An example of this situation may be a small spring flow stream not containing fish, but with natural habitat and water quality sufficient to support a DFAL macroinvertebrate community [see Part B. Subsection 4.06(4)]. Professional judgment should be used to determine the appropriate designated use in these situations.

Note: The following DFAL fish communities described in 2.04(4), 2.04(5), and 2.04(6) are particularly sensitive and may warrant additional protection from habitat and water quality alterations caused by some watershed, stream channel or lake bed modifications. Surface waters that contain or have the potential to contain any of these aquatic communities may warrant consideration for additional protection and should be highlighted in the use designation report to facilitate their management.

2.04(4) **Endangered, Threatened or Special Concern Species Waters (DFAL-ETSC):** This sub-class includes warm, cool and coldwater (without potential to contain salmonids) ecosystems that contain any aquatic (e.g. mussel, fish, macroinvertebrate) or semi-aquatic (e.g. herptile) species that are considered federal or state endangered, threatened or special concern. Endangered and threatened species are listed in Chapter NR 27 (Wis. Adm. Code). These species are in imminent danger of disappearing from Wisconsin and require the highest standards of protection. Special concern species are listed on the *Natural Heritage Inventory Working List*. The list is frequently updated and can be found on the DNR web page or by contacting the Bureau of Endangered Resources. Special concern species may not be in immediate danger of extirpation from the state but are vulnerable to decline. Without protection they may eventually qualify for formal listing as endangered or threatened. Using best professional judgment, the occurrence of a single individual ETSC species is sufficient to recommend this classification, unless there is evidence that the individual is a stray (e.g., an organism that may be present as a washout from an upstream population). The use designation report **must** indicate the reasons for considering a species a stray.

2.04(5) **Intolerant Fish Species Waters (DFAL-IF):** This sub-class includes warm and coolwater ecosystems that contain or have the potential to contain intolerant fish species (Appendix 3.E.). Intolerant fish species are particularly sensitive to environmental degradation such as habitat modifications, water quality degradation, water level fluctuations, or riparian vegetation alterations. They are among the first

* Coldwaters without the potential to contain a fish community could be classified as DFAL-MC waters

species lost as a surface water becomes degraded, and are excellent indicators of the overall health of a water body. This community type represents some of the highest quality DFAL waters in the state.

In general, this sub-class may apply most appropriately to waters with the potential to support a fish community where at least ten percent of the individuals are listed as intolerant fish species. Further, this sub-class may apply most appropriately to a stream with a score of 10 for the intolerant species metric of the index of biotic integrity (IBI). Scoring criteria for wadable streams and rivers are given in Lyons (1992), for large rivers in Lyons et al. (2001), and for inland lakes in Jennings et al. (1999). Note that moderately degraded waters often contain a few intolerant species. The mere presence of intolerant species does not automatically justify a DFAL-IF use designation.

2.04(6) **Coolwater Fish Species Waters (DFAL-CC):** This sub-class includes coolwater ecosystems that contain or have the potential to contain coolwater fish species as part of the aquatic community. The summer daily maximum temperature range in coolwater ecosystems is about 22-25^{o}C (72-77^{o}F) (J. Lyons 2003, pers. comm.). These waters may contain a unique fish community. Several fish species reach maximum abundance in coolwater systems and are considered coolwater indicator species (Appendix 3.D.). Coolwater systems may also contain a mix of coldwater indicator species such as sculpins and warmwater species such as sunfish.

Coolwater ecosystems represent an intermediate condition between coldwater and warmwater, and thus are difficult to define precisely. Temperature data in concert with the presence of coolwater indicator fish species is justification for a DFAL-CC use designation. In the absence of temperature data, this sub-class may be appropriate for waters where at least five percent of the individuals present are cool or coldwater indicator fish species.

2.05 TOLERANT AND VERY TOLERANT FISH & AQUATIC LIFE COMMUNITIES

Surface water communities assigned tolerant (TFAL) or very tolerant (VTAL) use designations must be promulgated in Chapter NR 104 (Wis. Adm. Code) after it has been established that such a water may not reasonably be expected to achieve full fish and aquatic life use. In general, a TFAL or VTAL use designation recognizes that those waters are not capable of supporting a CW-A, CW-B, or DFAL community due to natural or irretrievable habitat or water quality limitations. A **use attainability analysis,** as part of the Fish And Aquatic Life Use Designation Summary Form (Appendix 4), must be completed before assigning these designations and it must indicate which of the six elements specified in the Clean Water Act and reiterated in s. 283.15(4), Stats., is applicable. These are:

(1) *"Naturally occurring pollutant concentrations prevent the attainment of a Diverse Fish and Aquatic Life community."*

This condition could occur where vegetative growth and decay causes dissolved oxygen (DO) depletion due to respiration or biochemical oxygen demand (BOD), or can cause an extremely high or low pH. An example is a wetland stream or a wetland draining into a small stream. It is also possible in some parts of the state for a stream to contain toxic levels of metals, such as in southwestern Wisconsin where lead and zinc deposits are naturally located. Naturally occurring water quality problems are not common.

(2) *"Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of a Diverse Fish and Aquatic Life community, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating water conservation requirements." (Water conservation requirements are part of Federal law that requires reuse of water in some states and specific locations).*

This condition occurs where stream flow is very low or does not exist, even with the addition of treated effluent. An example would be a discharge of less than 0.1 cubic feet per second to a dry run. Another example is a discharge to a field or dry run that seeps into the ground before reaching another stream. Low flow and the resulting lack of aquatic habitat is a common cause that prevents the potential to attain a DFAL community.

(3) *"Human-caused conditions, or sources of pollution prevent the attainment of a Diverse Fish and Aquatic Life community and cannot be remedied or would cause more environmental damage to correct than to leave in place."*

This condition can occur where years of poor land management have resulted in sediment and nutrient deposits in streams and other water bodies. These deposits can result in habitat destruction and degraded water quality, may not be attributed to one source and cannot be remediated through enforcement or reasonable management actions. Degraded habitat or water quality will likely continue to persist even with better land management in the watershed.

(4) *"Dams, diversions or other types of hydrologic modifications preclude the attainment of a Diverse Fish and Aquatic Life community, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of a Diverse Fish and Aquatic Life community."*

Hydrologic modifications can affect habitat and water quality. Typical examples that prevent the potential to attain a DFAL community are concrete and channeled waterways. These actions can destroy habitat and affect water quality. Assuming these types of hydrologic modifications were installed under permit or pre-date existing regulations, it may not be socially or technically feasible to attempt remedial actions. Dams generally do not preclude attainment of a DFAL community but can affect the level of use attainment. Dams can preclude attainment of a salmonid community.

(5) *"Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of a Diverse Fish and Aquatic Life community."*

This condition is similar to condition 2, but stresses that the natural condition of the habitat is so naturally poor that the system never supported, and does not have the potential to ever support a DFAL community as a natural condition.

(6) *"Controls more stringent than those required by sections 301(b) and 306 of the [Clean Water] Act would result in substantial and widespread economic and social impact*."

Due to the complex and implementational nature of the economic and social impacts allowed by s. 283.15(4)(f), Stats., this factor is **not** within the purview of the use designation process and will **not** be considered as part of the use designation process.

2.06 TOLERANT FISH & AQUATIC LIFE (TFAL)

TFAL waters generally have the following habitat and water quality characteristics:

- **HABITAT/FLOW:** TFAL waters are generally small warmwater streams with normal 7Q2 flows less than 0.1 cubic feet per second, or shallow water bodies, containing natural or irretrievably limited water quality or habitat. Many TFAL waters will contain both limited water quality and habitat.

TFAL streams may maintain a small continuous flow year round, but can periodically become non-continuous with pooled water in dry periods. A stream with a normal 7Q2 flow greater than 0.1 cfs but with natural or irretrievably limited habitat or water quality not capable of attaining the criteria for a DFAL community can be designated a TFAL surface water. Water quality or habitat quality in these surface waters is generally capable of supporting a few fish and aquatic insects, but cannot support a Diverse Fish and Aquatic Life community, or intolerant, endangered, threatened or special concern fish, macroinvertebrate or other aquatic life species.

- **TEMPERATURE:** Future revisions to Chapter NR 102 (Wis. Adm. Code) may include specific ambient water quality criteria for TFAL streams. In the interim, it is assumed that temperatures in TFAL waters are generally similar to temperatures in DFAL waters.

- **DISSOLVED OXYGEN:** The dissolved oxygen criterion for TFAL waters is 3 mg/L.

The following TFAL Sub-Classes have been identified for Wisconsin:

2.06(1) **Tolerant Fish Waters (TFAL-F):** This sub-class includes ecosystems that contain or have the potential to contain a fish community dominated by species tolerant to low dissolved oxygen. These species are listed in Appendix 3.A. This sub-class applies most appropriately to a stream with a fish community where 75 to 100 percent of the individual organisms present are tolerant to low dissolved oxygen levels. When the low abundance or absence of fish species that cannot tolerate low DO is due to natural or irretrievable water quality problem or habitat characteristics the appropriate use designation is TFAL-F (see Part B, 4.06(4)).

2.06(2) **Tolerant Macroinvertebrate Waters (TFAL-M):** This sub-class includes ecosystems without the potential to contain a fish community, but with the potential to contain a macroinvertebrate community dominated by species tolerant to low dissolved oxygen levels. This sub-class applies most appropriately to a stream with a macroinvertebrate community where no more than 5 percent of the individual organisms present have Hilsenhoff Biotic Index (HBI) tolerance values less than or equal to 5, **and** 75 to 100 percent of the individual organisms present have HBI tolerance values greater than 5 and less than or equal to 8. When the absence of fish and the low abundance or absence of macroinvertebrate species with HBI tolerance values of less than or equal to 5 is due to natural or to irretrievable water quality or habitat characteristics the appropriate use designation may be TFAL-M (see Part B, 4.06(4)).

2.07 **VERY TOLERANT AQUATIC LIFE (VTAL):**

VTAL ecosystems do not have the potential to maintain a fish community. These waters may have extreme variation in flow, temperature and/or water quantity, yet may contain macroinvertebrate communities dominated by very tolerant species. Macroinvertebrates with HBI values between 8 and 10 are considered to be very tolerant. VTAL surface waters may periodically contain a few stray fish during high flow periods when water quality and habitat conditions allow for their brief existence. Waters that routinely contain seasonal fish communities should generally be designated as seasonal use surface waters.

VTAL waters generally have the following habitat and water quality characteristics:

- **HABITAT/FLOW:** VTAL waters are generally small streams or channels that may be dry except during rainy periods, or may contain pooled water and little if any flow. Habitat will generally be limited due to the lack of permanent water or cover for fish and macroinvertebrates. Small, but continuous flowing streams with little in-stream cover for fish or aquatic insects may be appropriately designated VTAL waters. Small, continuous flowing streams containing some cover for fish and

other aquatic life, but containing natural or irretrievably limited water quality may also be appropriately designated Very Tolerant Aquatic Life waters. **Additional habitat created by a proposed discharge must be considered in the use designation process.**

- **TEMPERATURE:** There are currently no numeric ambient water quality criteria for temperature for VTAL streams. Temperatures frequently reflect ambient air temperature.

- **DISSOLVED OXYGEN:** The dissolved oxygen criterion for VTAL waters is 1 mg/L, and is based on maintaining aerobic conditions.

The following VTAL Sub-Classes have been identified for Wisconsin:

2.07(1) **Very Tolerant Macroinvertebrate Waters (VTAL-M):** This sub-class includes ecosystems with the potential to contain a macroinvertebrate community dominated by very tolerant species where 75-100 percent of the individual organisms present have HBI tolerance values from more than 8 to less than or equal to 10. This designated use may be appropriate when the absence of fish and low abundance or absence of tolerant and intolerant macroinvertebrates is due to natural or irretrievable water quality or habitat characteristics (see Part B, 4.06(4)).

2.07(2) **No Fully Aquatic Life Waters (VTAL-NA):** This sub-class includes ecosystems that are defined as waters of the state but are generally dry except during run-off or discharge events, or the habitat conditions are such that aquatic life cannot exist.

3. FACTORS IN DIFFERENTIATING BETWEEN USES

Surface water use designation is intended to recognize that uses may vary from site to site and that different water quality criteria may be needed to ensure that an appropriate use is achieved and/or maintained. A **designated use** reflects stream conditions that may be reasonably expected if controllable environmental disturbances are managed properly. The designated use is the legally binding use by which environmental management decisions must be made. The use designation process recognizes that an **existing** use may not always represent the **attainable** use that might be achieved if environmental disturbances are ameliorated.

The existing use is defined by the fish and aquatic life community currently living in a surface water and is a function of the natural characteristics of the entire ecosystem and the cultural alterations or impacts which have occurred or are occurring. The attainable use in a surface water is a function of its natural characteristics and any existing cultural impacts that cannot be controlled or reversed. The attainable fish and aquatic life use can be different from the existing use where controllable impacts have degraded habitat or water quality to the point that pollution intolerant aquatic life cannot exist in a surface water.

In many cases, the existing, attainable, and designated fish and aquatic life use are the same. A water body in excellent condition with minimal environmental disturbance will likely have existing, designated, and attainable uses that are the same. In some cases, however, the uses may be very different where controllable impacts have an adverse impact on the stream community and therefore affect use attainment status.

If existing and attainable uses for a particular stream are determined to be the same, then the decision on the appropriate designated use is simple. Management actions can be geared to maintaining or enhancing the existing use. Where the existing and attainable fish and aquatic life uses differ, a decision on the appropriate target (the designated use) for management actions can be more difficult. Historically, the Department has assigned designated uses on streams with point source discharges, and staff may not have included projected improvements in the watershed that may result from managing polluted runoff. This is primarily because such changes are harder to predict than changes in treatment levels at permitted wastewater treatment plants, and few regulations existed to control polluted runoff. Thus in those streams dominated by polluted runoff the designated uses have often been based on existing use. Whether the origin of the impacts are point or nonpoint sources or both, consideration must be given to whether or not the impacts identified are natural and whether they are controllable.

3.01 FACTORS AFFECTING FISH & AQUATIC LIFE USES

For the purpose of designating surface water fish and aquatic life uses, **uncontrollable factors**, whether they are natural or cultural, ultimately determine attainable fish and aquatic life uses. **Controllable factors** and their impacts on surface waters are considered temporary, pending implementation of control measures. Some cultural factors may be considered uncontrollable because they cannot be managed, or are unlikely to be managed in the foreseeable future. In some cases these cultural factors and impacts may have, for all practical purposes, become irreversible surface water characteristics due to cultural, social, or other institutional reasons. Common natural and cultural factors that affect surface water uses and their controllability are listed in Table 2.

3.01(1) **Natural Factors:** Since most surface waters in Wisconsin have been disturbed by human activity it is difficult to define a totally natural factor. For use designation, natural factors are defined as an aquatic ecosystem's physical and chemical characteristics in the absence of controllable cultural impacts. Important natural factors include water volume (flow, depth, surface area), habitat structure, and "natural"

(background) physical and chemical water quality. Natural factors are generally considered uncontrollable, and generally determine a surface water's attainable fish and aquatic life uses.

3.01(2) **Cultural Factors:** Cultural factors are human activities on the land and in the water that may affect water quality, habitat quality and fish and aquatic life uses. Cultural factors are broadly defined as pollution sources, but also include such things as dams and habitat modifications, such as permitted dredging. Nearly all waters of the state have been disturbed by human activity, some more significantly than others. Cultural factors have an impact on habitat and water quality, attainable fish and aquatic life uses, and level of use attainment in a surface water.

Cultural factors and their effects on water quality and habitat can be further subdivided into controllable and uncontrollable types, or similarly, reversible and irreversible affects or impacts. Cultural impacts that fall under the state's regulatory authority, or that fall under on-going environmental management program efforts, are generally considered controllable for fish and aquatic life use designation purposes. In some cases, however, actions required to completely control or restore previous cultural impacts may not be possible or likely to occur.

TABLE 2. Common Factors Affecting Surface Water Fish & Aquatic Life Uses

Generally Uncontrollable Natural Factors:

Depth	Volume	Habitat Structure
Flow	Climate	Background Water Quality and Temperature
Gradient	Wetlands	Beaver Activity (Site-Specific Determination)

Generally Uncontrollable Cultural Factors:

Land Cover/Land Use
Legally Authorized Hydrologic Modifications (approved dredging and other drainage projects such as channel enclosure and channel lining, existing permitted dams)

Generally Controllable Cultural Factors:

Industrial Point Source Discharges
Municipal Point Source Discharges
Agricultural Nonpoint Sources (cropland, stream banks, animal waste)
Urban Nonpoint Sources (Stormwater)
Construction Site Runoff
Proposed Hydrologic Modifications (dams, ditching, water withdrawal, stream enclosures, dredging)
In-place Pollutants/Sediment Contamination (Site-Specific Determination)
Landfill Leachate
Septic System Leakage
Atmospheric Deposition (Site-Specific Determination)

3.02 DETERMINING IMPACT CONTROLLABILITY

Determining surface water impact controllability can be a critical step in designating fish and aquatic life uses. General guidance on how to determine source and impact controllability is provided in the following paragraphs to improve statewide decision-making consistency. Professional judgment about an appropriate designated use will, however, continue to be required.

3.02(1) **Natural Factors:** For all practical purposes, the natural characteristics of a surface water ecosystem are not considered controllable, including cultural modifications that have essentially become irreversible, such as approved channelization and dredging. Natural characteristics can, however, be

changed by natural forces and by approved modifications. Gradual cultural changes over time can be addressed by triennial standards reviews.

Natural habitat can be improved in some surface waters by building structures, selective dredging, and other in-stream and riparian management practices. Just because this is possible does not generally justify assigning a more sensitive designated use. Usually, surface waters considered for aggressive management actions, such as habitat improvement, would already contain a cold or warm water fishery and would have been so classified. Staff should be very cautious about factoring them into a recommendation for a use designation. This is especially true since the Department is required to periodically review use designations to see if changes need to be made. If changes have occurred in the sources of pollution, a use designation can and should be modified accordingly.

A difficult natural factor to interpret is the influence of beaver activity on stream characteristics. Beaver dams can inundate stream channels, cause sediment build up, increase water temperature, and decrease dissolved oxygen concentrations. Beaver activity is listed as an uncontrollable factor in Table 2, but each situation should be evaluated before determining controllability. The Department routinely manages beaver activity, especially where it threatens cold water fisheries. Beaver dams should generally be considered controllable when found to be affecting trout streams and other coldwater streams. The question of controllability is not as clear on small warmwater systems. Beaver activity can result in increasing the fish population and species assemblage in warmwater systems by increasing available habitat, if water quality is not significantly affected by the pooled water. Consideration should be given to historical beaver activity in the area, how a surface water is affected, and the fish and aquatic life use that might be attained if beavers were no longer present. Consultation with the regional wildlife biologist is encouraged when efforts to control beaver activity are being considered.

3.02(2) **Uncontrollable Cultural Factors:** Uncontrollable cultural factors are those activities over which regulatory agencies have little or no control, or control is not reasonable due to lack of technology, cost, or social interest. When determining controllability and appropriate designated uses, two cultural factors are commonly encountered that should generally be considered uncontrollable: (1) existing, but well-managed land use, and (2) legally authorized hydrologic modifications.

The present use of land for agriculture and urban development will, in most cases, not change. These cultural factors affect surface waters, but as long as they are conducted under acceptable best management practices, the land "uses" and impacts they have on surface waters are generally considered uncontrollable. Best management practice (BMP) examples include such things as tillage practices that reduce soil erosion, stream bank fencing, manure management practices, runoff diversion, sediment detention, street sweeping, etc. When such practices are found to be in place in a watershed, and little more can be done to reduce polluted runoff, any remaining surface water impacts caused by those pollutants would generally be considered uncontrollable.

More obvious cultural factors affecting surface waters are hydrologic alterations. Existing dams, legally approved dredging or channelization projects, and wetland drainage are examples of surface water alterations that can affect uses. The question of controllability is technically and legally complex, but assuming that these structures and how they are operated are legally authorized, their impacts must generally be considered uncontrollable for determining appropriate uses. When a dam is removed, or land is taken out of cultivation, a surface water's designated use can be reviewed and revised if appropriate.

3.02(3) **Controllable Cultural Factors:** Controllable cultural factors are pollutant sources or actions the state has the authority to regulate, or for which programs exist to encourage management actions. These factors include those sources and actions listed in Table 2. Municipal and industrial point source

discharges, and agricultural and urban runoff are the most common controllable factors encountered when classifying surface water uses.

The Wisconsin Pollutant Discharge Elimination System (WPDES) regulates point source discharges under authority granted to the Department by U.S. Environmental Protection Agency. Point sources are, within technological bounds, always controllable. Point source impacts on water quality and surface water uses that are technically controllable should generally not influence a designated use. A surface water designated use should generally be based on the use it has the potential to attain with its natural habitat and water quality. **Effluent flow added to a stream's natural flow must also be factored into a designated use.** General guidance on how to factor the addition of effluent flow into a designated use is found in Section 5.

Agricultural and urban nonpoint sources may also be considered controllable for surface water use designation purposes. Since the promulgation of revised and new runoff management administrative rules in October 2002, the DNR has increased authority to address persistent nonpoint source pollution problems statewide. The primary components of the DNR's runoff management program include the implementation of three runoff management grant programs, point source permitting of storm water and agricultural runoff sources, and implementation of state regulatory performance standards. The management strategy for the program is aimed at abating urban and agricultural polluted runoff. For use designation purposes, controllable nonpoint sources are pollutant sources that can be managed by implementing best management practices (BMPs) in agricultural and urban watersheds. **In situations where applying nonpoint source BMPs is likely to result in water quality and fish and aquatic life use improvements, the designated use should be based on the use that could be attained by controlling nonpoint source problems.**

Controllable nonpoint sources of pollution are defined as those sources that cause an in-stream problem, are clearly manageable and if managed along with point sources, would clearly result in attaining potential uses in a surface water. These pollutant sources include such things as feed lots, barn yards, severe bank erosion, severe gully erosion, poorly managed crop land, and any other site-specific source of runoff that in the professional judgment of the investigator would result in attaining a designated use if properly managed.

Other controllable cultural factors may have immediate and direct effects on surface water uses. For example, a flow management scheme that results in routinely withholding or diverting water may preclude certain uses and aquatic communities. Such actions are almost always controllable. Pollution sources such as rural septic systems and landfill leachate are generally controllable. Proposed stream alterations, such as dams and straightening, are controllable because these are regulated activities. Even an existing dam, already discussed as being uncontrollable, may be removed or managed in certain ways to reduce impacts on stream uses. When these factors preclude the attainable use from being achieved, the impact should be considered and if found to be controllable the recommended designated use should be based on the attainable use with controls in place.

The controllability of some factors such as in-place pollutants (e.g. contaminated sediments and air deposition) may not be as easily determined. Some situations may be technically difficult or unreasonably expensive to correct while some may be reasonable to control. A detailed site-specific evaluation and consultation with technical staff may be required to determine controllability when these types of impacts are encountered. In these cases, it is strongly recommended that staff compare existing biological, chemical, and physical conditions to similar conditions at a reference site.

4. USE DESIGNATION PROCEDURES

Surface water fish and aquatic life uses are designated by evaluating and describing aquatic ecosystems. This section covers the factors that commonly need to be evaluated, and provides guidance on how to merge data and professional judgment into final decisions about appropriate designated uses.

4.01 REASONS TO INITIATE USE DESIGNATION EFFORT

A monitoring project to classify, or re-evaluate a fish and aquatic life use designation can be initiated for several reasons, including:

4.01(1) **Triennial Standards Review:** The Department is required by the Clean Water Act to periodically review the use designation of waters currently designated as TFAL or VTAL to determine if environmental factors have changed in a way that would warrant a revision to the use designation. Changes in environmental factors may be due to many things, including changes in flow, removals of dams or other structures, or even changes in environmental regulations that result in physical changes to the riparian zone (e.g., implementation of nonpoint source performance standards, etc.).

4.01(2) **Time:** In some cases, field assessments that led to original use designations took place in the 1970's. Where appropriate, it may be advisable to re-evaluate those waters with contemporary field data.

4.01(3) **WPDES Permits:** An applicant for a discharge permit may be considering discharge alternatives and needs the designated uses for alternative sites to develop facility plans.

4.01(4) **Nonpoint Source Management Projects:** These types of projects may require monitoring to assess conditions and water quality problems prior to developing management plans. Major monitoring objectives are to identify attainable uses in surface waters, determining if those uses are being fully attained, and if not, identifying what needs to be managed so that uses will be fully attained. These use-designation procedures can be used to plan and conduct nonpoint source management monitoring projects.

4.01(5) **Chapter 30 Permits:** In some cases, for a chapter 30 permit to be issued, updated information must be acquired for a waterbody. These use designation procedures can be followed to gather information for both purposes.

4.01(6) ***State of the Basin Reports*:** Coupled with baseline monitoring activities, these guidelines can also be used to provide data for state of the basin projects, a major objective of which is to identify fish and aquatic life uses, determine levels of use attainment, and to identify problems in waters where uses are not being attained.

4.02 TIMING OF USE DESIGNATION EFFORT

Fish and aquatic life are generally dependent upon conditions that normally occur during periods of annual low stream flow. Use designation monitoring should generally not be conducted during periods of high flow, extreme low flow, drought, or the winter months. Fish community monitoring, water quality measurements, and habitat assessments may more reliably indicate attainable fish and aquatic life use if conducted when a stream is at base flow. Base flow is the flow that is typically associated with measured or estimated 7Q2 stream flows. The recommended time period to assess uses and use attainment is June 1 to September 30. Depending on annual climatic variations, the time period may be extended or reduced in some years. In situations where seasonal use changes are possible, additional seasonal data may be

needed. Macroinvertebrates should be sampled in early spring and late fall (Guidelines for Collecting Macroinvertebrate Sampels from Wadable Streams, WDNR, 2000).

4.03 EXISTING DATA SOURCES

When initiating a use designation review, an effort should be made to locate and review all applicable data for a particular water. Data sources are numerous and may include files, studies, reports, and other publications and lists such as:

- Ch. NR 104 (Wis. Adm. Code)
- *Wisconsin Trout Streams* [WDNR Pub. 6-3600(80)]
- *Smallmouth Bass Streams in Wisconsin* [WDNR Pub. 22-3600(78)]
- *Wisconsin Lakes Directory* [WDNR Pub. FM-800] & [http://www.dnr.state.wi.us/org/water/fhp/lakes/list/]
- River Basin Management Plans
- Nonpoint Source Priority Watershed Appraisal Reports and Management Plans
- County Surface Water Inventory Reports
- Previous Use Designation Reports
- WDNR Master Fish File (http://intranet.dnr.state.wi.us/int/water/fhp/)
- WDNR Fisheries and Habitat Biology Database (http://intranet.dnr.state.wi.us/int/water/fhp/)
- Macroinvertebrate database
- Fish-Sediment Contaminant Database

Existing information may be adequate to form the basis for a designated use. For example, a surface water known to contain a warmwater sport fishery does not require a formal use designation. It is a DFAL water by default. Further, a stream listed in *Wisconsin Trout Streams* (1980) is considered a Coldwater-A or Coldwater-B simply by reference in s. NR 102.04(3)(a) (Wis. Adm. Code). Choosing the appropriate sub-class can be accomplished based on the information found in *Wisconsin Trout Streams*. Determining if a use is being fully attained will generally require data collection and comparison to a reference site. When no information is found or when data are old or not sufficient to confidently recommend a fish and aquatic life use designation, a site inspection is warranted to finalize a recommendation for an appropriate use designation.

4.04 FIELD PROCEDURE SUMMARY

This section can be used as a study design for a fish and aquatic life use designation project. All elements of the procedure do not always need to be completed. If it is obvious that a stream segment fits into a particular sub-category, the biologists are advised to complete the minimum data fields needed on a use designation report form and to conclude the investigation. The effort required to recommend a credible fish and aquatic life use designation varies from site to site and may range from no fieldwork (i.e., reviewing only the available information) to performing an extensive field assessment of a stream segment and its watershed. This guidance focuses solely on identifying the appropriate fish and aquatic life use designation with the least expense in resources.

Ideally, it would be preferable to collect a comprehensive and complete set of data at each site. Realistically, resources are limited and this document highlights the key steps for assigning a use with the minimum resources. Complex situations may require that additional studies be conducted.

Forming a recommendation for an appropriate use designation for a given surface water segment requires at least one, and possibly all of the following steps. Specific methods for collecting this information are recommended and discussed in Section 4.05 below.

4.04(1) **Review** existing information about the fish and aquatic life community and any other available information. Existing data about a surface water may be adequate to designate and justify a fish and aquatic life use. In general, larger streams and lakes need less monitoring to determine a use designation because existing information is more likely to be available. Small streams with 7Q2 flows less than 1.0 cfs, low gradient streams, wetlands and other shallow surface waters generally require more information and are often the most difficult to classify.

4.04(2) **Assess** the existing fish and aquatic life community, generally observe habitat quality, estimate stream flow, and measure water temperature.

4.04(3) **Estimate** the existing use by comparing the fish community, macroinvertebrate community, and temperature data to the criteria for the fish and aquatic life use sub-categories described in Sections 2.01 through 2.05. If the existing use is TFAL or VTAL it may be necessary to locate a similar reference site in the same geographic area to help determine if that use is appropriate or if a more sensitive use might be attainable. Reference site conditions will also help determine if a fish and aquatic life use is fully or only minimally attained. See Section 4.06 for information on reference sites.

4.04(4) **Identify** any in-water conditions or problems that may limit or prevent a surface water from supporting organisms that are less tolerant to pollution. Quantitative habitat data, additional dissolved oxygen and temperature data, and other water quality data may be required to identify problems and limiting factors. Section 2 describes water quality and habitat conditions generally associated with each designated use sub-category.

4.04(5) **Identify** controllable causes and sources of any conditions that may limit or prevent a surface water from supporting organisms that are less tolerant to pollution.

4.04(6) **Evaluate** the potential for the surface water quality to improve under proper management, and if resulting improvements would be likely to allow a surface water to meet a specified attainable use. More detailed habitat and water quality data may be required to evaluate this potential. Comparison to a reference site will provide valuable information for this step.

4.04(7) If the existing use is the best that can reasonably be attained, **recommend** the existing use as the designated use. If the existing use can be improved by implementing management actions, recommend the use that could be attained with full implementation of the noted management actions.

4.04(8) **Report** the results of this analysis and recommend the most appropriate fish and aquatic life use designation for the surface water segment assessed. The specific reasons for the recommendation should be clearly summarized in the report.

4.05 MONITORING METHODS

This section provides guidance on specific monitoring procedures and methods for assessing fish and aquatic life uses and use attainment. All staff should use similar methods to help achieve statewide consistency in classifying surface waters.

4.05(1) **Fish Community Assessment -** All surface water fish and aquatic life designated uses require information about the existing fish community. If current information is insufficient to designate a use, a fish community assessment is required. The effort needed to determine and justify the appropriate use can depend on the number of fish and the species found in a short distance. For example, if one riffle or

pool is shocked and more than 25 percent of the individual fish assessed are not tolerant to low dissolved oxygen (see Part B 4.06(4)), it may be concluded that the data are representative of the community and additional detailed monitoring is probably not required. **The fish sampling procedure found below is recommended. A minimum of 100 meters stream length should, however, always be assessed for any size stream.**

When a more complete fisheries survey is required for a use designation or to meet some other objective, the sampling procedure found in *Using The Index of Biotic Integrity (IBI) To Measure Environmental Quality In Warmwater Streams of Wisconsin* (Lyons 1992) should be used. The procedure for calculating an IBI in coldwater streams is found in *Development and Validation of an Index of Biotic Integrity for Coldwater Streams in Wisconsin* (Lyons, et al. 1996*)*. The sampling procedure for both warm and coldwater is the same and is found in the Lyons (1992) publication. If a point source discharges to a stream segment in question, monitoring above and below the discharge point should be conducted. If the stream above the point source is similar (see Section 4.06) to the stream below, the upstream segment may serve as a reference site. When either a cursory or a more intense fish community survey is conducted record the information requested on the Wadable Stream Fish Community Evaluation Form (Form 3600-230), or other more appropriate form.

NOTE: The sampling procedure described by Lyons, et al. (1996) recommends not sampling fish in odd habitats such as culvert plunge pools, a single riffle, near connected lakes, etc. When collecting data for use designations, all habitats should be sampled, including any odd habitats that may not always be representative of a stream reach. Data collected from habitats not recommended by the sampling procedure should, however, be kept separate so that an IBI score can be calculated. In most cases all data, including fish data collected from odd habitats, should be used to recommend a fish and aquatic life use designation. In addition, the warmwater IBI may not be valid for streams less than 2.5 meters wide. Likewise, it is not recommended to calculate an IBI score (warm or cold) if fewer than 50 individual fish are collected in a sample reach.

4.05(2) **Habitat Assessment -** A habitat assessment should generally be conducted as part of the use assessment because these data will often prove useful. A habitat assessment may not be essential if a designated use can be justified without it. At a minimum, information needed at each site includes the estimated stream flow and the average stream width and depth. In situations where the existing fish and aquatic life community is not diverse or contains only pollution-tolerant species, a habitat assessment can help determine if a surface water has the potential to support a community of organisms that are not tolerant to low dissolved oxygen levels.

For medium- to high-gradient streams, the recommended procedure for assessing habitat is *Guidelines For Evaluating Fish Habitat in Wisconsin Streams* (Simonson, et al.1994), however these guidelines have not been calibrated for streams smaller than 1.5 meters in width. For low gradient streams, the recommended habitat assessment procedure is found in *Development and Evaluation of a Habitat Rating System for Low Gradient Wisconsin Streams* (Wang, et al. 1998). Low gradient streams are defined as having gradients less than or equal to 3 meters per kilometer (15.9 ft/mile), and less than 5 percent of their length in riffles.

4.05(3) **Habitat and Fish Assessments for Small and Intermittent Streams -** The habitat assessment procedures described above are designed for permanently flowing streams. Modified procedures have been developed for collecting habitat data from very small and intermittent streams. Habitat rating procedures for these conditions are under development. Until new rating procedures for intermittent streams are developed, the habitat rating procedure for small streams should be used (J. Lyons 2002, pers. comm.).

Regardless of stream width, each assessment site will be approximately 100 meters long, allowing some flexibility to take advantage of natural starting or stopping points (e.g., riffles, log jams). Sites should start and stop away from pools or riffles created by bridges. If the extent of bridge influence on the stream channel is not obvious then sites should start and stop at least 20 meters from bridges. The exact same site will be sampled at each visit, even if the site is partially dry (see below).

Habitat is sampled following the above referenced habitat evaluation procedures (J. Lyons 2002, pers. comm.). Specifically, each site has 12 equally spaced transects. Minimum dimensions and depth for cover will be 0.2 meters. Riparian buffer width is measured out to 20 meter on each side of the stream. The percent of bare soil in the first 1 meter of bank is measured from the water's edge regardless of water level, but the percent of bank erosion will be estimated for the bank that exists during normal flows. In other words, areas of de-watered channel at low flows are not to be included as part of the estimate of the percent of bank erosion.

Fish are sampled using a single backpack electro-shocker. All fish captured are identified and, counted by species. Game fish and pan fish are measured for total length.

Special procedures for intermittent streams: If not all of the length of the site contains water, then special procedures are followed for habitat measurements. During the mapping phase, each length of dry channel is measured and entered in the appropriate column on the station map sheet. The total length of dry channel is determined and entered on the station summary sheet (Enter 0 meters if the entire site has water. Enter the total site length if the entire site is dry). All transects will be equally spaced within areas with water. For example:

4.05(3)(a) At normal flow with the water present in the full 100 meters: Each transect should be spaced 7.7 meters apart (100 m /13 = 7.7 m)

4.05(3)(b) At low flow with water present in 60 continuous meters: Each transect should be spaced 4.6 meters apart within the watered area (60 m /13 = 4.6 m). Total length of dry channel is 40 meters.

4.05(3)(c) If the watered portion of the site is broken up into two or more isolated areas, then transects will be distributed proportionally among the watered areas. Transects should be evenly spaced within each isolated area (J. Lyons 2002, pers. comm.). For example:

At low flow the site has a 30-meter pool, a 25-meter pool, and a 5-meter pool, all separated by dry areas. The total wetted length is 60 meters and the total dry length is 40 meters. Six transects should be run in the 30-meter pool (30 m/60 m = 50%; 50% of 12 = 6) with each transect spaced 4.3 m apart (30 m /7 = 4.3 m). Five transects should be run in the 25-m pool (25 m/60 m = 42%; 42% of 12 = 5) with each transect spaced 4.2 meters apart (25 m /6 = 4.2 m). One transect should be run in the 5-meter pool (5 m/60 m = 8%; 8% of 12 = 1) with this transect centered in the middle of the pool.

4.05(3)(d) If the site is completely dry, then no aquatic habitat measurements are taken.

4.05(4) **Water Quality Assessment -** The water quality parameters generally of most concern for designating fish and aquatic life uses are dissolved oxygen and temperature. Parameters such as suspended solids, ammonia and other toxic substances can also significantly affect attainable fish and aquatic life uses. It may become important to measure these parameters when assessing why a fish and aquatic life use is not fully attained. Toxic substances, usually associated with point source discharges and polluted runoff, are generally considered controllable.

Similarly, dissolved oxygen and temperature impacts may be influenced by point and nonpoint source discharges. Both parameters are, however, heavily influenced by natural – and uncontrollable – factors such as water source, impoundments, soils, geology, channel morphology, etc. Since those environmental factors cannot be controlled, ambient dissolved oxygen and temperature generally become important parameters when determining appropriate fish and aquatic life uses.

Water quality conditions – including dissolved oxygen and temperature – may not require assessment if the existing fish and aquatic life community is representative of the designated use and data for those parameters are not needed for other purposes. Measuring dissolved oxygen and temperature when at a site is, however, always recommended. If the appropriate designated use is not obvious based on the existing fish and aquatic life community and other information, more detailed water quality data may be required. Common questions concerning water quality include whether background dissolved oxygen levels and temperatures are adequate to support a more diverse and sensitive fish community than currently exists.

When additional data are required, dissolved oxygen and temperature should be measured continuously for at least three days in July and August when stream flow is low or at least normal, and water temperature is near its maximum for the year. If a point source or significant nonpoint source (such as a barnyard) discharge is present, these measurements should be made up- and downstream of these sites. Water samples may also need to be collected up- and downstream for ammonia or other toxic substances that may be associated with a discharge and may be affecting the fish and aquatic life community. Methods for using dissolved oxygen and temperature recording equipment and for collecting water samples are found in the *WDNR Field Procedures Manual*. This document is available in hard copy from the Department's Bureau of Integrated Science Services or available to Department staff at: http://Intranet/Int/ES/Science/LS/FPM/Table.HTM.

4.05(5) **Macroinvertebrate Assessment -** When a fish community is absent or does not meet the criteria for a CW-A, CW-B, or DFAL sub-category, assessment of the macroinvertebrate community may be needed to designate an appropriate fish and aquatic life use.

Macroinvertebrates should be collected using the Department's standard procedures for the habitat type at each sampling location. Sample identification can range from field identification at locations with few individuals and species, to laboratory identification, to species at sites with high numbers and diversity. The percent relative abundance of intolerant species in the community will need to be determined. **For these procedures intolerant species are considered those with HBI tolerance values of 5 or less.** HBI tolerance values are species-dependent and range from 0-10 (Hilsenhoff 1987).

4.05(6) **Additional Assessments -** Some sites can be difficult to evaluate and may require additional information before reaching a decision about an appropriate fish and aquatic life designated use. These difficult situations are often associated with small streams (7Q2 less than 1 cfs), wetlands and other shallow water bodies, streams with limited habitat, low-gradient streams, streams with flows dominated by effluent, or streams that support variable fish and aquatic life communities seasonally. More detailed information may also be needed to determine why an existing use does not match up with the attainable use and to begin identifying what may be reasonably controlled to achieve the attainable use. Examples of additional information that could be needed to complete an assessment include:

- Sediment chemistry, including toxic substances, acid volatile sulfides, etc.
- Ambient water chemistry, including toxic substances, total suspended solids (TSS), pH, etc.
- Ambient water column, sediment, and effluent toxicity tests.

- Seasonal measures of surface water conditions, including appropriate biological, chemical, and physical parameters.

Specific guidance on when and how to collect more detailed information can be obtained from procedure manuals and from experienced Department staff. Experienced staff in the bureaus of Fisheries and Habitat Protection and Watershed Management that are familiar with the stream of concern should be consulted where a seasonal fish and aquatic life community may be present.

4.06 DATA INTERPRETATION

In many cases, the designated use assigned to a surface water reflects the existing fish and aquatic life community after consideration of the criteria for each sub-category described in Section 2. An existing community may not, however, always reflect the attainable fish and aquatic life use. This is often the case where controllable pollutant sources affect water quality or habitat. Section 3 discusses pollutant sources and impact controllability.

There are two basic ways to determine if existing conditions do not represent an attainable use.

One way is to consider the basic water quality and habitat needs for a sub-category that is more sensitive than the existing use. If those needs may be met by implementing appropriate point or nonpoint source management actions in the watershed, then the existing use may not be indicative of the attainable use. **This is basically a professional judgment method and is only possible when very experienced local staff are involved. Justification for, and defensibility of, a use designation are based on the credentials of the individual.**

The second way is to compare conditions at assessment sites to conditions at other similar sites that are not significantly affected by these sources of pollution. The relatively unaffected sites are termed **reference sites**. The concept can be looked at as an extension of the traditional upstream/downstream studies used to evaluate point source impacts. Environmental conditions measured upstream from a discharge are compared to conditions downstream from a discharge to evaluate discharge impacts to a receiving water. The upstream conditions establish the **reference conditions** that should be attained downstream if the treatment level is adequate to protect water quality and fish and aquatic life uses. The shortfall of this procedure is that upstream conditions may not be as good as they could be due to further upstream sources, or due to downstream sources affecting upstream uses. Comparing assessment site ecological conditions to conditions at other locations with similar natural characteristics is a logical refinement to a traditional procedure, and provides the means to more effectively evaluate all types of pollutant sources.

The following sections discuss reference sites and reference conditions and provide information on basic water quality and habitat requirements for each fish and aquatic life use sub-category.

4.06(1) **Reference Sites** are surface waters that are "least impacted" by pollutant sources and are ecologically similar to an assessment site. Exceptions often exist for every rule, but reference sites should contain the highest quality water, habitat, and fish and aquatic life communities reasonably attainable in a geographic area. (**Note**: Reference sites in most parts of the state should generally not be sites characterized as pristine. Pristine conditions would apply to those waters that are altogether uncorrupted, or have not been influenced significantly by human activity. Such sites are rare and may not be indicative of the use attainment goals that are reasonably achievable in populated areas.)

4.06(2) **Reference conditions** are the environmental indicator values measured at reference sites and may include biological, chemical, and physical parameters. When environmental indicator data are collected at least-impacted sites, the indicator values – or value ranges – become the goals for assessment sites that would

be expected to have similar ecosystem characteristics if not affected. In most situations the following routine indicators should be adequate for a valid comparison (all data should be collected following the procedures recommended in this document):

- Fish community including species list, number of individuals, index of biotic integrity (IBI) metric values and total score
- Macroinvertebrate community including taxa list and HBI/ family level biotic index (FBI) or other index score
- Fish Habitat Suitability Index
- Measured or estimated base flow including 7Q2 and 7Q10, and an estimate of any seasonal flows deemed appropriate (only needed for seasonal designated uses)
- Basic water quality data including dissolved oxygen levels, temperature, and pH. DO and temperature data should be collected continuously for several days during warm weather and normal to low-flow conditions.

Environmental indicator data collected at reference sites are compared to data collected at assessment sites. This comparison serves two important functions: (1) The reference conditions help identify the appropriate fish and aquatic life use that can be attained at a similar assessment site, and (2) the reference conditions help determine whether the designated use is fully, minimally, or not attained due to controllable sources.

Ideally, reference conditions can be based on data from more than one reference site, all with similar ecological characteristics and in the same geographic area. Environmental indicator data from multiple reference sites are used to develop metric ranges that identify the attainable conditions for the surface water type. These indicator data ranges become ecoregional reference conditions for similar waters within the same geographic area. Assessment streams with biological indicator values falling within the reference condition ranges are generally meeting their attainable use. Waters with values poorer than the minimum within the ranges are either minimally or not meeting their attainable use. The fish and aquatic life use of the reference sites establishes the attainable use to be designated at a similar assessment site, unless some uncontrollable disturbance is present that precludes the use from being attained at an assessment site.

To validly compare reference site conditions to assessment site conditions the sites must have reasonably similar natural characteristics including flow, gradient, temperature, substrate, watershed land use, hydrologic modifications and connectivity to a larger water body. For example, it is not appropriate or valid to compare a large stream to a small stream, or a meandering stream with riffles to a straight low-gradient stream. The following guidelines are provided to help in selecting reference sites that are comparable to assessment sites.

4.06(2)(a) **Stream Flow -** Stream flow is defined as the normal summer low flow. For use designation purposes, this is represented by the 7Q2 flow. A reference site and an assessment site should both fall within the same flow range. Flow range groupings that should be considered include:

- **Less than 0.5 cfs**
- **0.5 – 1 cfs**
- **1 – 5 cfs**
- **5 – 10 cfs**

- **10 – 50 cfs**
- **50 – 100 cfs**
- **Greater than 100 cfs**

These ranges are not intended to be exclusive, but serve as guidelines for consideration. For example, a reference stream with a flow of 0.8 cfs might be comparable to an assessment stream with a flow of 0.5 cfs if other site selection criteria are similar. There are many situations that may exist, but a few of the more common considerations related to flow include:

- A flowing reference site should not be compared to a dry run, with the possible exception of seasonal flow. A flowing reference site can be used to estimate the potential fish and aquatic life use where effluent is to be added to a dry run.

- Streams with pooled, non-flowing water during dry periods might be compared to small streams with continuous flow if pool depth and water quality is sufficient to maintain a fish and other aquatic life community. Pool depth should generally be 1 foot or greater to maintain a fish community during non-flowing periods.

4.06(2)(b) **Stream Gradient -** A number of gradient categories could be developed. For reference site selection and the relationship of gradient to fish and aquatic life use attainment, the main factor affecting use is the presence or absence of riffles. Therefore, the guidelines are to compare low gradient waters without riffles to other waters without riffles, and waters with riffles to other waters with riffles. The criteria for selecting appropriate reference sites are:

4.06(2)(b)1 **Low-gradient streams:** Streams with gradients less than or equal to three miles per kilometer (15.9 ft/mile) and less than 5 percent of their length in riffles.

4.06(2)(b)2 **Medium- to high-gradient streams:** Streams with gradients more than three m/km (15.9 ft/mile), and 5 percent or more of their length in riffles

Note: the following special situations can apply to these criteria:

a) Riffles created and only found at bridges or culverts may not count as riffles for evaluating comparability.

b) Some small streams with moderate gradient may contain relatively swift flowing water but not contain riffles. These streams may contain overhanging grass or other flow obstructions that create habitat similar to riffles. This situation might be reasonably compared to an otherwise similar reference site with riffles.

4.06(2)(c) **Temperature -**Temperature is defined as the **maximum temperature during any year**. This is the continuously recorded temperature over a 24-hour period during the warmest days of the year, usually in July or August. These following temperature ranges vary from those reported in Lyons et al. 1996. Additional research has shown these temperature ranges are more representative of conditions in Wisconsin (J. Lyons 2002, pers. comm.). Surface waters with temperatures near the ends of these ranges ($\pm$ 1^o or 2^o C) might still be appropriately used as reference sites for higher or lower temperature waters if other criteria are similar.

4.06(2)(c)1. **Warm water: greater than 25^{o}C (77^{o}F)**
4.06(2)(c)2. **Cool water: 22 to 25^{o}C (72 to 77^{o}F)**
4.06(2)(c)3. **Cold water: less than 22^{o}C (72^{o}F)**

4.06(2)(d) **Substrate Type -** Substrate type is defined as the dominant natural substrate material present or that would be present in the absence of controllable impacts. Examples of substrate type include:

- **Sand -** Streams that have predominantly sand substrates, but may contain a few large rocks and may contain exposed small gravel in riffles.
- **Rock/gravel** - Streams with rock/gravel riffles and a mixture of rock, gravel, and fine material in runs and pools.
- **Clay** - Streams with firm clay substrates and the general absence of rock and gravel.
- **Silt/detritus** - Streams with generally fine unconsolidated material and the absence of rock and gravel.

4.06(2)(e) **Habitat Rating (small stream procedures are under development) -** Habitat in an assessment stream should be potentially similar to habitat in reference streams. (Suggestion: the potential habitat rating value at an assessment site should be within 75 percent of the value for the reference condition habitat rating).

4.06(2)(f) **Uncontrollable Factors that May Affect Attainment of Fish and Aquatic Life Uses -** Several stream and watershed characteristics generally considered uncontrollable can significantly affect aquatic biota and use attainment. Uncontrollable and controllable factors affecting fish and aquatic life uses are discussed in Section 3.01, Part B. The following common uncontrollable factors may be important in the reference site evaluation and selection process:

4.06(2)(f)1. **Land Cover** - Reference site selection should generally be based on the watershed land cover at the assessment site. Since the definition of a reference site is least impacted, the management of these lands must also be considered. The land cover category is generally considered uncontrollable, but how well the cover is managed to reduce impacts to surface waters is generally considered controllable for designating attainable fish and aquatic life uses. In most cases the land cover and land use that directly affects a surface water is of most concern rather than land cover and land use in the entire watershed.

The following land cover types are based on WISCLAND (Wisconsin Initiative for Statewide Cooperation on Land cover Analysis and Data) Level 1 (more general) and Level 2 (more specific) land cover classifications. Except for the agriculture land cover classification, the Level 1 classifications may be adequate for selecting reference sites. Level 2 classifications should generally be used for agricultural land cover. Level 2 classifications may also be appropriate in highly urbanized watersheds. In some situations it may be necessary to add additional levels. For example, if the watershed adjacent to a stream is mostly pasture it may be appropriate to classify the pasture use as high or low intensity. More information regarding WISCLAND classifications can be viewed at *http://www.dnr.state.wi.us/maps/gis/datalandcover.html*

- Urban/Developed (High Intensity, Low Intensity, Golf Course) *[LEVEL 1]*
- Agriculture *[LEVEL 1]*
  - (Row Crops, Forage Crops, Cranberry Bog, Barn Yards/Feed Lots near stream [not a WISCLAND classification]) *[LEVEL 2/3]*
- Grassland (Timothy, Rye, Pasture, Idle, CRP, Grass, Volunteer) *[LEVEL 1]*
- Forest *[LEVEL 1]*
  - (Coniferous, Broad-leaved Deciduous, Mixed Deciduous/Coniferous) *[LEVEL 2]*
- Open Water *[LEVEL 1]*
- Wetland *[LEVEL 1]*
  - (Emergent/Wet Meadow, Lowland Shrub, Forested) *[LEVEL 2]*

- Barren *[LEVEL 1]*
- Shrubland *[LEVEL 1]*

4.06(2)(f)2. **Hydrologic Modifications** - Legally authorized hydrologic modifications include ditching, dams and water withdrawal. These conditions may affect attainable fish and aquatic life uses and should be considered in the reference site evaluation and selection process. For example, the attainable fish and aquatic life use in a ditched stream should be evaluated by comparing the assessment site to the use at a similar least-impacted, ditched reference site, not to a reference site with a naturally meandering channel of similar size in the area. The presence of a dam upstream or downstream from an evaluation site may also affect fish and aquatic life uses. A dam may block fish migration or may affect water quality. In general, if a dam is located within one mile of an evaluation site a reference site affected by a similar condition should be located.

The appropriate use designation may be affected if a stream is tributary to or receives outflow from a lake or large river. Some conditions where this may be observed include:

- Where a small stream is tributary to a lake with a surface area that is 5 acres or larger and the assessment site is within one mile of the lake.

- Where a small stream receives outflow from a lake with a surface area that is 5 acres or larger and the assessment site is within one mile of the lake.

- Where a small stream is tributary to larger stream with a 7Q2 flow of 50 cfs or greater and the assessment site is within one mile of the larger stream.

In some situations **wetlands** contiguous to or upstream from a stream segment may have an effect on the use designation by influencing stream conditions such as habitat, water quality, and flow extremes. Where fish and aquatic life uses may be affected by wetlands, a reference site with similar conditions should be located for comparison. In general, an assessment stream that flows through a wetland or is within one mile downstream from a 5 acre or larger wetland should be compared to a reference site with similar conditions.

4.06(3) **Attainability Analysis Without A Reference Site –** If a reference site is unavailable it may be necessary to combine techniques to reach a conclusion. To predict water quality after point or nonpoint improvements occur, mathematical models and professional judgment are usually used. Predicting the effect of point source effluent improvement is generally simpler than predicting the effect of nonpoint source improvements. To determine the attainable use the predicted water quality changes are coupled with a habitat rating that takes into account any controllable habitat impacts. The recommended habitat rating procedures are applicable to most streams in need of designation with the exception of streams less than 2 meters wide. A habitat rating procedure for small streams is currently under development.

The procedures described above are simplest when the habitat rating is a constant. Sometimes a controllability analysis will require predicting the effect of a habitat change on attainable fish and aquatic life use. For example, it may be necessary to predict the effect of markedly changing the stream flow or channel shape if these factors are considered to be practically controllable. While the habitat rating procedure can sometimes be used for this purpose, a more rigorous habitat assessment using mathematical models such as PHABSIM (Milhous, et al. 1984) or HSI (Bovee 1982) may be needed. These models allow staff to project habitat quality at alternate flow regimes and as a result of physical modification. They can also determine if habitat is limiting for individual species and separate out the effect of individual habitat components. Using PHABSIM or HSI procedures is very resource intensive and will generally not be possible without assistance from outside the Department.

4.06(4) **INDIVIDUALS TOLERANT TO LOW DISSOLVED OXYGEN: 75 TO 95 PERCENT RANGE -**
The 75 to 95 percent range for individual fish or macroinvertebrates in a community that are tolerant to low levels of dissolved oxygen is used to determine the existing fish and aquatic life use designation. The range allows for considering the number of species in the community, the number of individuals in the community, and habitat quality when assessing the existing use designation. The existing designation is then used to help determine the appropriate use designation to recommend. The appropriate percentage to use is based on professional judgment in each situation.

The following guidance is provided to help make that decision. The 75 to 95 percent tolerant to low dissolved oxygen range would generally not apply to surface waters containing more than two individual game fish per 100-meter stream length.

In general, the factors to consider when selecting a percentage cutoff for fish tolerant to low DO are:

4.06(4)(a) Use a 95 percent cutoff when:

- Fewer habitat tolerant species are present
- Higher numbers of individual fish are present
- Higher numbers of fish species are present

4.06(4)(b) Use a 75 percent cutoff when:

- More habitat-tolerant species are present
- Lower numbers of individual fish are present
- Lower numbers of fish species are present

4.06(4)(c) Use a cutoff between 75 and 95 percent when:

- The data does not clearly fit one or more of the factors listed above

The appropriate percent of individuals tolerant to low dissolved oxygen levels to use in determining if the existing use is DFAL or TFAL is a function of the relative abundance of DO-tolerant fish, disturbed habitat-tolerant fish and other fish present. This is best illustrated with some examples.

Example 1: If all species present are listed as tolerant to low DO and disturbed habitat conditions the percent used should be closer to 75 percent individuals listed as tolerant to low DO to be defined a DFAL community. In other words, if about 25 percent or more of the individuals are species listed as tolerant to disturbed habitat the existing community would be defined a DFAL community**.** When the fish community is right at the cusp between an existing use of TFAL and DFAL allow your professional judgment to determine the most appropriate existing use designation.

Narrative Interpretation

IF	All of the fish collected belong to species that are tolerant to low DO (as per the list in Appendix 3a) **and** fish tolerant to disturbed habitat.
AND IF	The percent individuals tolerant to low DO is greater than 75 percent
THEN	Existing Use is TFAL
ELSE	Existing Use is DFAL

Example 2: If the community contains one or two species that are not listed as tolerant to disturbed habitat conditions or low DO the percentage should be in the middle range for individuals tolerant to low DO to be defined a DFAL community. For example, if the community contained redbelly dace and the percent of individuals in the community including species listed as tolerant to disturbed habitat was 10 to 20 percent, the existing use could be defined DFAL. The end of the range to use could depend on the relative number of redbelly dace found. If few were found it might be appropriate to use 80 percent DO-tolerant individuals. If several were found it might be more appropriate to use 90 percent of tolerant individuals as the determinant.

Narrative Interpretation

IF	Most of the fish collected belong to species that are tolerant of low DO and fish tolerant of disturbed habitat.
AND IF	The fish community includes one or two other species (i.e. other than the species listed as tolerant of low DO or disturbed habitat).
AND IF**	There are very low numbers of individual "other" species
AND IF	The percent individuals tolerant of low DO is greater than 80
THEN	Existing Use is TFAL
ELSE	Existing Use is DFAL

**

AND IF	There are a number of individuals of the 1 or 2 "other" species
AND IF	The percent of individuals tolerant of low DO is greater than 90
THEN	Existing Use is TFAL
ELSE	Existing Use is DFAL

Example 3: If the community contains more than two species not listed as tolerant to low DO levels or disturbed habitat the percent used should be closer to 95 percent of individuals tolerant to low DO to be defined a DFAL community. The relative number of species and number of individuals not tolerant to low DO or disturbed habitat in the community can be used to decide if the appropriate percent should be 95 or somewhat higher**.**

Narrative Interpretation

IF	Most of the fish collected belong to species that are tolerant of low DO and fish tolerant of disturbed habitat.
AND IF	The fish community includes three or more other species (i.e. other than the species listed as tolerant of low DO or disturbed habitat).
AND IF	The percent individuals tolerant of low DO is greater than 95
THEN	Existing Use is TFAL
ELSE	Existing Use is DFAL

If the fish population is less than 50 fish per 100 meter stream length, and less than five species are present, the percent of individuals tolerant of low DO levels may be closer to 75 percent to be defined a DFAL community. This provides some flexibility in defining an existing use based on professional judgment.

The above guidelines can be applied to macroinvertebrates as well by considering species with HBI values of 5 or less to be intolerant of low DO. **Please keep in mind that these guidelines are for determining the existing use only. The recommended designated use should be based on the attainable (potential) use, not the existing use**.

4.06(5) **Final Interpretation Where Existing Use Is Similar to Attainable Use:** If professional judgment and/or data from reference sites suggest no discernible differences exist between the reference site and the assessment site, a use designation recommendation should be made that is the equivalent of the current existing use. To fully interpret the fishery data you may also need to refer to fish and macroinvertebrate species tolerances, and to current listings of endangered/threatened and special concern species.

4.06(6) **Final Interpretation Where Existing Use Is Different Than Attainable Use:** If professional judgment and/or data from reference sites suggest distinct differences exist between reference sites and assessment sites, additional information must be collected. In particular, those additional data should be collected to fill gaps in comparative data between the least-impacted reference sites and assessment sites. Using the water quality and habitat characteristics for a particular use designation, additional monitoring should be conducted that focuses on identifying and evaluating local factors that may limit use attainment. When limiting factor(s) have been identified, it will be necessary to determine if they can be controlled, and whether or not actions taken to control the identified factors have the potential to improve the existing fish and aquatic life community. In those cases where improvements would likely result in a use designation that is different than the existing use, the attainable use designation should be recommended.

5. SPECIAL SITUATIONS

Conditions may be encountered that require site-specific management and regulatory actions to assure ecosystem protection. This section focuses on how to address situations that may be uncommon or do not conform to the more typical fish and aquatic life use designation situations described in earlier sections of this guidance.

5.01 EFFLUENT CHANNELS

An **effluent** is defined as a liquid discharge from a WPDES-permitted facility including stormwater-permitted facilities.

An **effluent channel** is an open channel constructed to transport effluent from a WPDES-permitted facility to a discharge point in a surface water or natural drainage way. An effluent channel is a hydrologic classification category in NR104.02(1), and is categorically assigned a VTAL fish and aquatic life use designation. "Surface waters" means all natural and artificial named and unnamed lakes and all naturally flowing streams within the boundaries of the state, but not including cooling lakes, farm ponds and facilities constructed for the treatment of wastewaters. "Wetlands" means an area where water is at, near or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which has soils indicative of wet conditions.

The distinguishing features that separate effluent channels from surface waters are: (1) pre-existing bed and bank morphology and (2) pre-existing wet conditions such as those identified with a wetland. If these features are present, the channel is a surface water and does not qualify for designation as an effluent channel. In general, a channel can only be designated an effluent channel if it is constructed across land that is not wet and does not have a deep swale or gully that channelizes runoff. A channel constructed in a shallow swale without a distinct eroded bed and bank can be designated an effluent channel.

Drainage ditches constructed primarily for relieving excess waters from agricultural lands are not defined as effluent channels. Continually flowing or intermittent natural watercourses that are modified or unmodified to receive effluents shall not be defined as effluent channels except where it is environmentally beneficial.

5.02 EFFLUENT-DOMINATED STREAMS

An effluent-dominated stream is one where the effluent flow exceeds the 7Q10 stream flow. This typically occurs when a discharge goes to a dry run, an intermittent stream or to a small permanent stream. Determining the appropriate use designation in these situations can be difficult, especially where a discharge is to a naturally dry run that does not meet the effluent channel definition. In this situation a discharge has created a stream that must be classified based on the quality of the habitat that has been or will be created by the discharge. In a situation where the discharge is to an intermittent or small permanent stream the fish and aquatic life use designation must be based on the quality of the habitat that has been or will be augmented by the effluent.

The following guidelines are proposed for designating fish and aquatic life uses where a discharge is to a dry run or small stream.

5.03 PROPOSED DISCHARGE TO A DRY RUN - EXISTING USE IS VTAL

5.03(1) Proposed discharge is less than 0.1 cfs: Designate the fish and aquatic life use as **TFAL** except in the following situations:

5.03(1)(a) Designate the biological use as DFAL when reference streams in the area indicate that DFAL is attainable at flows similar to the discharge design flow;

5.03(1)(b) Designate as VTAL where the discharge will not reach a stream or other surface water that would provide a source of fish for the created stream. This is a situation where the effluent seeps into the ground or enters a surface water that would be classified as VTAL, and adding effluent would not improve the fish and aquatic life use;

5.03(1)(c) Designate as VTAL when the discharge is intermittent and any pooled water remaining in the non-discharge period would not be capable of maintaining any fish community.

5.03(2) Proposed discharge is equal to or greater than 0.1 cfs

5.03(2)(a) Select a warm water reference site(s) with flows similar to the design flow of the proposed discharge and determine its existing fish and aquatic life use;

5.03(2)(b) Designate the use for the proposed discharge the same as found at the reference site(s), with the same exceptions as in 5.03(1);

5.03(2)(c) Where no appropriate reference sites are available designate the use as DFAL with the same exceptions as in 5.03(1);

5.04 **PROPOSED DISCHARGE TO AN INTERMITTENT OR CONTINUOUS STREAM:** Determine the fish and aquatic life use in the receiving stream under current conditions (without effluent addition).

5.04(1) If the existing use is CW-A, CW-B or DFAL then designate it as the attainable fish and aquatic life use in the flow-augmented stream.

5.04(2) If the existing use is TFAL or VTAL locate a reference stream in the area with a base flow similar to the combined natural base flow and discharge design flow. Designate the fish and aquatic life use in the flow-augmented stream the same as the fish and aquatic life use in the reference stream.

5.04(3) If there is no reference site available, designate the fish and aquatic life use as TFAL when the combined natural base flow and discharge design flow is less than 0.1 cfs. Designate the fish and aquatic life use as DFAL when these flows are 0.1 cfs or greater.

5.05 **EXISTING DISCHARGES OR EVALUATIONS FOR PROPOSED FACILITY EXPANSIONS:**

The guidelines described above can be applied to existing facilities that discharge to surface waters with VTAL or TFAL use designations. It may be necessary to estimate the surface water conditions that existed prior to start-up of the facility under review. The review of these fish and aquatic life use designations would normally occur when gathering data for State of the Basin Reports.

6. REPORTING DESIGNATED USES

Formal reports must receive Regional approval and be submitted to the Central Office Water Quality Standards Section for final review and approval. This process is required for any surface water designated uses that will be included in the Wisconsin Administrative Rules or will be used to develop effluent limits. The *Fish and Aquatic Life Designated Use Form* included as Appendix 4 (An electronic link will be placed on the Department's Intranet), is used to report use designations. The form includes some mandatory elements that are key for all use designations. The form also includes a template for additional supporting information. It is not always necessary to complete each section with exhaustive detail. Additional narrative and data can be added to supplement the form as needed. Photographs of each site assessed are recommended and if available should be included in the report. Where noted in the report form**, all mandatory reporting elements must be included** or the report will be returned to the author.

Mandatory report elements are indicated on the form. The required elements include locational information and approvals, discharger information, fish community data, and justification for a TFAL or VTAL (LFF or LAL) classification recommendation.

Approval Process

1. Author obtains report approval from designated Regional staff (Watershed Expert, Regional Water Leader);
2. Approved report is submitted to designated staff in the Central Office who will review the report for statewide consistency and will work directly with basin staff to resolve any issues related to a report;
3. When a report and recommended use designation receive final approval from the Water Quality Standards Section it will be included in future updates to applicable administrative rules.

Since use designations may be controversial and contested by external parties, it is advisable to prepare a comprehensive and complete file on each stream or lake evaluated. All final reports will be maintained in a central repository in the Bureau of Watershed Management in Madison and in field offices.

7. DEFINITIONS

Attainable Use -- the ecological grouping that a waterbody or portion thereof can achieve if controllable cultural factors are reduced or eliminated

Base flow -- the lowest natural flow of a stream without influence from surface runoff.

Channellized wetland – channels exist, which would be expected to transport effluent through the wetland with minimal hydraulic influence.

Class I Trout waters – high quality trout waters, having sufficient natural reproduction to sustain populations of wild trout at or near carrying capacity. These streams do not require stocking of hatchery trout.

Class II-n Trout waters – Trout streams that may have some natural reproduction, but not enough to utilize available food and space. These streams have good carryover of adult trout. The "n" represent knowledge that naturally reproducing trout exist in the waterbody.

Class II-x Trout waters – Trout streams that may have some natural reproduction, but not enough to utilize availabe food and space. These streams have good survivial and carryover of adlt trout. The "x" represents knowledge that the trout in the waterbody are stocked.

Class III Trout waters – Trout streams with marginal trout habitat and no natural reproduction. These streams require annual stocking of trout to provide trout fishing. Generally, there is no carryover of trout from one year to the next.

Continuous stream – contains flowing water throughout a normal year. However, may become intermittent during 10-year frequency droughts (i.e. 7Q10=0).

Designated Use – use specified in state water quality standards, regardless of whether use is being attained

Dry run – contains flowing water only during runoff events. Pools exist for only a few days after a runoff event. Has a defined bed and bank. Vegetation is terrestrial in nature.

Effluent Channel –an open channel constructed to transport effluent from a WPDES-permitted facility to a discharge point in a surface water or natural drainage way

Existing Use – use currently being attained in a waterbody

Intermittent stream – contains no flowing water at some time most every year. May contain flowing water for several weeks after runoff events. Pools exist for weeks after runoff events. Vegetation is a mix of both terrestrial and aquatic plants

Maximum Daily Mean Temperature – mean temperature recorded over a 24-hour period during the warmest days of the year—generally July and August

Potential Use : see "Attainable Use"

7Q2 -- the measure of the annual minimum seven-day mean stream flow, based on two-year low

7Q10 -- the measure of the annual minimum seven day mean stream flow, based on a ten year low

Standards review - The Clean Water Act requires that States review and revise (as appropriate) their water quality standards on a three-year cycle. This requirement includes reviewing the fish and aquatic life use designation of surface waters classified as TFAL or VTAL where the fish and aquatic life use may have changed due to watershed improvements.

Surface Water – a natural or artificial lake or flowing stream within the boundaries of the state, but not including cooling lakes, farm ponds, and facilities constructed for the treatment of wastewaters.

Stenothermal – capable of living or growing only within a limited range of temperature.

Swale - contains flowing water only during runoff events. Pools exist for only a few days after a runoff event. Has no defined bed and bank. Vegetation is terrestrial in nature. Effluent channels can be constructed in this environment.

Use Attainability Analysis – a structured scientific assessment of the factors affecting the attainemnt of uses of a water body.

Wetland – an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic vegetation, and which has soils indicative of wet conditions.

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APPENDIX 1. FISH SPECIES RECORDED IN WISCONSIN WATERS AS OF 2001

NATIVE SPECIES

Common Name	Scientific Name
LAMPREYS	**PETROMYZONTIDAE**
Chestnut Lamprey	*Ichthyomyzon castaneus*
Northern Brook Lamprey	*Ichthyomyzon fossor*
Southern Brook Lamprey	*Ichthyomyzon gagei*
Silver Lamprey	*Ichthyomyzon unicuspis*
American Brook Lamprey	*Lampetra appendix*
STURGEONS	**ACIPENSERIDAE**
Lake Sturgeon	*Acipenser fulvescens*
Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
PADDLEFISHES	**POLYODONTIDAE**
Paddlefish	*Polyodon spathula*
GARS	**LEPISOSTEIDAE**
Longnose Gar	*Lepisosteus osseus*
Shortnose Gar	*Lepisosteus platostomus*
BOWFINS	**AMIIDAE**
Bowfin	*Amia calva*
MOONEYES	**HIODONTIDAE**
Goldeye	*Hiodon alosoides*
Mooneye	*Hiodon tergisus*
FRESHWATER EELS	**ANGUILLIDAE**
American Eel	*Anguilla rostrata*
HERRINGS	**CLUPEIDAE**
Skipjack Herring	*Alosa chrysochloris*
Gizzard Shad	*Dorosoma cepedianum*
MINNOWS	**CYPRINIDAE**
Central Stoneroller	*Campostoma anomalum*
Largescale Stoneroller	*Campostoma oligolepis*
Redside Dace	*Clinostomus elongatus*
Lake Chub	*Couesius plumbeus*
Spotfin Shiner	*Cyprinella spiloptera*
Gravel Chub	*Erimystax x-punctatus*
Brassy Minnow	*Hybognathus hankinsoni*
Mississippi Silvery Minnow	*Hybognathus nuchalis*
Pallid Shiner	*Hybopsis amnis*
Striped Shiner	*Luxilus chrysocephalus*
Common Shiner	*Luxilus cornutus*
Redfin Shiner	*Lythrurus umbratilis*
Shoal Chub	*Macrhybopsis hyostoma*
Silver Chub	*Macrhybopsis storeriana*
Pearl Dace	*Margariscus margarita*
Hornyhead Chub	*Nocomis biguttatus*
Golden Shiner	*Notemigonus crysoleucas*
Pugnose Shiner	*Notropis anogenus*
Emerald Shiner	*Notropis atherinoides*
River Shiner	*Notropis blennius*
Ghost Shiner	*Notropis buchanan*
Ironcolor Shiner	*Notropis chalybaeus*
Bigmouth Shiner	*Notropis dorsalis*
Blackchin Shiner	*Notropis heterodon*

Common Name	Scientific Name
MINNOWS (cont.)	**CYPRINIDAE**
Blacknose Shiner	*Notropis heterolepis*
Spottail Shiner	*Notropis hudsonius*
Ozark Minnow	*Notropis nubilus*
Carmine Shiner	*Notropis precobromus*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis stramineus*
Weed Shiner	*Notropis texanus*
Mimic Shiner	*Notropis volucellus*
Channel Shiner	*Notropis wickliffi*
Pugnose Minnow	*Opsopoeodus emiliae*
Suckermouth Minnow	*Phenacobius mirabilis*
Northern Redbelly Dace	*Phoxinus eos*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Finescale Dace	*Phoxinus neogaeus*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Bullhead Minnow	*Pimephales vigilax*
Longnose Dace	*Rhinichthys cataractae*
Western Blacknose Dace	*Rhinichthys obtusus*
Creek Chub	*Semotilus atromaculatus*
SUCKERS	**CATOSTOMIDAE**
River Carpsucker	*Carpiodes carpio*
Quillback	*Carpiodes cyprinus*
Highfin Carpsucker	*Carpiodes velifer*
Longnose Sucker	*Catostomus catostomus*
White Sucker	*Catostomus commersonii*
Blue Sucker	*Cycleptus elongatus*
Creek Chubsucker	*Erimyzon oblongus*
Lake Chubsucker	*Erimyzon sucetta*
Northern Hog Sucker	*Hypentelium nigricans*
Smallmouth Buffalo	*Ictiobus bubalus*
Bigmouth Buffalo	*Ictiobus cyprinellus*
Black Buffalo	*Ictiobus niger*
Spotted Sucker	*Minytrema melanops*
Silver Redhorse	*Moxostoma anisurum*
River Redhorse	*Moxostoma carinatum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Greater Redhorse	*Moxostoma valenciennesi*
BULLHEAD CATFISHES	**ICTALURIDAE**
Black Bullhead	*Ameiurus melas*
Yellow Bullhead	*Ameiurus natalis*
Brown Bullhead	*Ameiurus nebulosus*
Channel Catfish	*Ictalurus punctatus*
Slender Madtom	*Noturus exilis*
Stonecat	*Noturus flavus*
Tadpole Madtom	*Noturus gyrinus*
Flathead Catfish	*Pylodictis olivaris*
PIKES	**ESOCIDAE**
Grass Pickerel	*Esox americanus vermiculatus*
Northern Pike	*Esox lucius*
Muskellunge	*Esox masquinongy*

APPENDIX 1. FISH SPECIES RECORDED IN WISCONSIN WATERS AS OF 2001 (CONT.)

NATIVE SPECIES (Cont.)

Common Name	Scientific Name
MUDMINNOWS	**UMBRIDAE**
Central Mudminnow	*Umbra limi*
TROUTS	**SALMONIDAE**
Cisco/Lake Herring	*Coregonus artedi*
Lake Whitefish	*Coregonus clupeaformis*
Bloater	*Coregonus hoyi*
Deepwater Cisco	*Coregonus johannae*
Kiyi	*Coregonus kiyi*
Blackfin Cisco	*Coregonus nigripinnis*
Shortnose Cisco	*Coregonus reighardi*
Shortjaw Cisco	*Coregonus zenithicus*
Pygmy Whitefish	*Prosopium coulteri*
Round Whitefish	*Prosopium cylindraceum*
Brook Trout	*Salvelinus fontinalis*
Lake Trout	*Salvelinus namaycush*
TROUT-PERCHES	**PERCOPSIDAE**
Trout-perch	*Percopsis omiscomaycus*
PIRATE PERCHES	**APHREDODERIDAE**
Pirate Perch	*Aphredoderus sayanus*
CODFISHES	**GADIDAE**
Burbot	*Lota lota*
TOPMINNOWS	**FUNDULIDAE**
Banded Killifish	*Fundulus diaphanus*
Starhead Topminnow	*Fundulus dispar*
Blackstripe Topminnow	*Fundulus notatus*
NEW WORLD SILVERSIDES	**ATHERINOPSIDAE**
Brook Silverside	*Labidesthes sicculus*
STICKLEBACKS	**GASTEROSTEIDAE**
Brook Stickleback	*Culaea inconstans*
Ninespine Stickleback	*Pungitius pungitius*
SCULPINS	**COTTIDAE**
Mottled Sculpin	*Cottus bairdii*
Slimy Sculpin	*Cottus cognatus*
Spoonhead Sculpin	*Cottus ricei*
Deepwater Sculpin	*Myoxocephalus thompsonii*
TEMPERATE BASSES	**MORONIDAE**
White Bass	*Morone chrysops*
Yellow Bass	*Morone mississippiensis*
SUNFISHES	**CENTRARCHIDAE**
Rock Bass	*Ambloplites rupestris*
Green Sunfish	*Lepomis cyanellus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth	*Lepomis gulosus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*

Common Name	Scientific Name
SUNFISHES (CONT.)	**CENTRARCHIDAE**
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
PERCHES	**PERCIDAE**
Western Sand Darter	*Ammocrypta clara*
Crystal Darter	*Crystallaria asprella*
Mud Darter	*Etheostoma asprigene*
Rainbow Darter	*Etheostoma caeruleum*
Bluntnose Darter	*Etheostoma chlorosoma*
Iowa Darter	*Etheostoma exile*
Fantail Darter	*Etheostoma flabellare*
Least Darter	*Etheostoma microperca*
Johnny Darter	*Etheostoma nigrum*
Banded Darter	*Etheostoma zonale*
Yellow Perch	*Perca flavescens*
Logperch	*Percina caprodes*
Gilt Darter	*Percina evides*
Blackside Darter	*Percina maculata*
Slenderhead Darter	*Percina phoxocephala*
River Darter	*Percina shumardi*
Sauger	*Stizostedion canadensis*
Walleye	*Sander vitreus*
DRUMS	**SCIAENIDAE**
Freshwater Drum	*Aplodinotus grunniens*

APPENDIX 1. FISH SPECIES RECORDED IN WISCONSIN WATERS AS OF 2001 (CONT.)

ESTABLISHED NON-NATIVE SPECIES

Common Name	Scientific Name
LAMPREYS	**PETROMYZONTIDAE**
Sea Lamprey	*Petromyzon marinus*
HERRINGS	**CLUPEIDAE**
Alewife	*Alosa pseudoharengus*
MINNOWS	**CYPRINIDAE**
Goldfish	*Carassius auratus*
Common Carp	*Cyprinus carpio*
SMELTS	**OSMERIDAE**
Rainbow Smelt	*Osmerus mordax*
TROUTS	**SALMONIDAE**
Coho Salmon	*Oncorhynchus kisutch*
Rainbow Trout	*Oncorhynchus mykiss*
Kokanee/Sockeye Salmon	*Oncorhynchus nerka*
Chinook Salmon	*Oncorhynchus tshawytscha*
Brown Trout	*Salmo trutta*
STICKLEBACKS	**GASTEROSTEIDAE**
Threespine Stickleback	*Gasterosteus aculeatus*
TEMPERATE BASSES	**MORONIDAE**
White Perch	*Morone americana*
PERCHES	**PERCIDAE**
Ruffe	*Gymnocephalus cernuus*
GOBIES	**GOBIIDAE**
Round Goby	*Neogobius melanostomus*
Tubenose Goby	*Proterorhinus marmoratus*

TRANSIENT NON-NATIVE SPECIES

Common Name	Scientific Name
HERRINGS	**CLUPEIDAE**
American Shad	*Alosa sapidissima*
MINNOWS	**CYPRINIDAE**
Grass Carp	*Ctenopharyngodon idella*
Red Shiner	*Cyprinella lutrensis*
Rainbow Sharkminnow	*Epalzeorhynchos frenatum*
Bighead carp	*Hypophthalmichthys nobilis*
Rudd	*Scardinius erythrophthalmus*
Tench	*Tinca tinca*
CHARACINS	**CHARACIDAE**
"Pacu" or "Pirapatinga"	*Colossoma* or *Piaractus* sp.
Red Piranha	*Pygocentrus nattereri*
BULLHEAD CATFISHES	**ICTALURIDAE**
Blue Catfish	*Ictalurus furcatus*
LONGWHISKERED CATFISHES	**PIMELODIDAE**
Redtail Catfish	*Phractocephalus hemioliopterus*
TROUTS	**SALMONIDAE**
Cutthroat Trout	*Oncorhynchus clarki*
Pink Salmon	*Oncorhynchus gorbuscha*
Atlantic Salmon	*Salmo salar*
Arctic Grayling	*Thymallus arcticus*
LIVEBEARERS	**POECILIIDAE**
Western Mosquitofish	*Gambusia affinis*
Guppy	*Poecilia reticulata*
TEMPERATE BASSES	**MORONIDAE**
Striped Bass	*Morone saxatilis*
CICHLIDS	**CICHLIDAE**
Oscar	*Astronotus ocellatus*
"Tilapia"	*Tilapia*? or *Oreochromis* sp.

APPENDIX 2. FISH AND AQUATIC LIFE USE SUB-CATEGORY MINIMUM EXPECTATIONS

Fish & Aquatic Life Sub Category	Dissolved Oxygen	Minimum Expectations
COLDWATER A	6 mg/L 7 mg/L (Spawning)	**Potential to meet all expectations** 1. Naturally reproducing salmonid community containing more than one age group above the age of 1 year. 2. Year-to-year salmonid survival. 3. Will typically maintain good water quality and habitat. 4. Generally continuous stream flow. 5. More than 2 individual salmonids per 100 meters. 6. Maximum daily mean temperature approximately 22°C (77°F).
COLDWATER B	6	**Potential to meet all expectations** 1. No natural salmonid reproduction with community sustained by stocking or migration. 2. More than 2 individual salmonids per 100 meters. 3. Will typically maintain good water quality and habitat. 4. Maximum daily mean temperature approximately 22°C (77°F).
DIVERSE FISH AND AQUATIC LIFE	5	**Potential to meet one or more expectations** 1. Game fish community with more than 2 individuals per 100 meters (except salmonids, Green Sunfish, Black Bullheads and Yellow Bullheads). 2. Non-game fish community with 5 to 25 percent or more of the individuals present characterized as being not tolerant of low dissolved oxygen. 3. Macroinvertebrate communities with a significant number of individuals (5 to 25 percent or more) belonging to taxa with HBI tolerance values of 5 or less. 4. Any fish, macroinvertebrates or other aquatic, or semi-aquatic species listed as endangered, threatened or special concern species.
TOLERANT FISH AND AQUATIC LIFE	3	**Potential to meet one or more expectations** 1. No potential to meet the above criteria. 2. Non-game fish community dominated by individuals (75 to 100 percent) belonging to species that are tolerant to low dissolved oxygen. 3. Macroinvertebrate community with a significant number of individuals (numerically 75 to 100%) belonging to species with HBI tolerance values greater than 5.
VERY TOLERANT AQUATIC LIFE	1	1. No potential to meet the above criteria. 2. No potential to sustain a fish community. 3. Any macroinvertebrate community dominated (75 to 100%) by individuals belonging to species with HBI tolerance values greater than 8.

APPENDIX 3. WISCONSIN FISH SPECIES AS INDICATORS OF WATER QUALITY AND HABITAT CHARACTERISTICS

3.A. Fish Species Tolerant to Low Dissolved Oxygen (Lyons 1992 and J. Lyons 1999, pers. comm.). Low dissolved oxygen species are defined as species that may survive and inhabit surface waters with DO concentrations routinely in the 1 to 3 mg/L range, but may still need 3 to 5 mg/L DO to fully complete life cycles. The following nine fish species are the only species to be used to calculate the percent tolerant individuals in a fish community.

Central Mudminnow	Black Bullhead	Golden Shiner
Goldfish	Yellow Bullhead	Fathead Minnow
Common Carp	Brook Stickleback	Green Sunfish

3.B. Fish Species Tolerant to Disturbed Habitat: The following species are in the IBI "tolerant species" list (Lyons, 1992) but are not included in the tolerant to low dissolved oxygen list. These species may be found in waters with routinely low dissolved oxygen concentrations, but a fully developed community would not generally be expected to survive. This list is provided to aid in assessing the role of habitat in controlling use, and may be used to aid in determining the appropriate percent-tolerant species value to use in calculating the percent-tolerant individuals in a fish community, especially when the fish community is less than 50 fish per 100 meter stream length (see Subsection 2.10).

Creek Chub	Western Blacknose Dace
White Sucker	Bluntnose Minnow

3.C. Stenothermal Coldwater Fish Species (J. Lyons 2003, pers. comm. [modified from Lyons et al. 1996])

Salmonids	Mottled Sculpin
American Brook Lamprey	Slimy Sculpin
Longnose Sucker	

3.D. Stenothermal Coolwater Fish Species (J. Lyons 2003, pers. comm. [modified from Lyons et al. 1996])

Northern Brook Lamprey	Northern Redbelly Dace
Southern Brook Lamprey	Finescale Dace
Redside Dace	Pearl Dace
Lake Chub	Muskellunge
Brassy Minnow	Burbot

3.E. Intolerant Fish Species (Lyons 1992, Lyons et al. 1996, and Lyons et al. 2001): Intolerant fish species are defined by Lyons (1992) as being sensitive to poor water quality, siltation and increased turbidity, and reduced habitat heterogeneity (e.g., channelization).

Lampreys
Chestnut Lamprey (ammocoete only)
Northern Brook Lamprey
Southern Brook Lamprey
Silver Lamprey (ammocoete only)
American Brook Lamprey

Trouts
Brook Trout

Pikes
Muskellunge

Carps and Minnows
Redside Dace
Gravel Chub
Mississippi Silvery Minnow
Speckled Chub
Pallid Shiner
Ghost Shiner
Pugnose Shiner
Blackchin Shiner
Blacknose Shiner
Spottail Shiner
Ozark Minnow
Carmine Shiner
Rosyface Shiner
Weed Shiner

Suckers
Highfin Carpsucker
Longnose Sucker
Blue Sucker
Northern Hog Sucker
Black Buffalo
Spotted Sucker
Black Redhorse
Greater Redhorse

Bullhead Catfishes
Slender Madtom

Sunfishes
Rock Bass
Longear Sunfish
Smallmouth Bass

Perches
Western Sand Darter
Crystal Darter
Rainbow Darter
Iowa Darter
Least Darter
Banded Darter
Gilt Darter
Slenderhead Darter

Sculpins
Mottled Sculpin
Slimy Sculpin
Spoonhead Sculpin

APPENDIX 4. FISH & AQUATIC LIFE USE DESIGNATION REPORT FORM

USE DESIGNATION REPORTING

Surface water use designations that will be codified, or will be used to develop effluent limits, require formal reports approved by regional Watershed Expert, Regional Water Leader (or designee), as well as by the Water Quality Standards Section Chief. The Fish and Aquatic Life Use Designation Form should be used to report the results of use designation studies, use designation recommendation, and approved use designations. Additional narrative and data can be added to supplement the form as needed. A Word template has been provided for including supplemental information. Please provide as much information as you can on the form.

Required information for all Use Designation Reports (indicated on form)**:**

☐ **Locational information**

☐ **Discharger information**

☐ **Fish community data**

☐ **Justification for TFAL/VTAL (LFF/LAL) designation**

☐ **Approvals**

Surface water use designations can be controversial and may be contested. Therefore, more information and data is always preferred. This form is available on the intranet at http://intranet.dnr.state.wi.us/itworks/forms/eforms.asp , Form 3200-121 (12/04).

State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Fish and Aquatic Life Use Designation Summary

Form 3200-121 (12/04)

(Attach supporting data sheets)

Use Designation Information – Required

Water Body Name	WBIC #	Date

Region:	Basin	County
☐ NER ☐ NOR ☐ SCR ☐ SER ☐ WCR		

Quad Map Where Segment is Shown

Reference Site(s) (Attach use designation form for reference site/cond.)

Segment Description for Segment _____ of _____ (headwater = segment 1)

From:

upstream _____ ☐ mi., ☐ km., ☐ ft., ☐ M.

Latitude: DEG	MIN	SEC	N

Longitude: DEG	MIN	SEC	W	Datum Used

Township	N	Range	☐ E ☐ W	Section	¼-Section	¼, ¼-Section

To:

Latitude: DEG	MIN	SEC	N

Longitude: DEG	MIN	SEC	W	Datum Used

Township	N	Range	☐ E ☐ W	Section	¼-Section	¼, ¼-Section

Attach site map and photos (prefer digital) showing stream segment and discharge point.

Date Fieldwork Conducted/Completed

Use Designation Status:
- ☐ New Use Designation (First Field Assessment)
- ☐ Standards Review (Updating Previous Field Assessment)
- ☐ Reference Site

Current Codified Fish and Aquatic Life Use Designation:
- ☐ Coldwater Community
- ☐ Warmwater Sport Fish Community
- ☐ Warmwater Forage Fish Community
- ☐ Tolerant Fish and Aquatic Life Community (LFF)
- ☐ Very Tolerant Aquatic Life Community (LAL)

- ☐ Default
- ☐ Field Assessment – Date (mm/dd/yyyy): _____

Existing FAL Use Based on Current Data:
- ☐ Coldwater Community
- ☐ Warmwater Sport Fish Community
- ☐ Warmwater Forage Fish Community
- ☐ Tolerant Fish and Aquatic Life Community (LFF)
- ☐ Very Tolerant Aquatic Life Community (LAL)

Recommended Attainable Use Designation:
- ☐ Coldwater A (Coldwater)
- ☐ Coldwater B (Coldwater)
- ☐ Diverse Fish and Aquatic Life
- ☐ Tolerant Fish and Aquatic Life (LFF)
- ☐ Very Tolerant Aquatic Life (LAL)

Recommended Seasonal Use Designation(s): Effective Date: (mm/dd/yyyy)
- ☐ Coldwater A (Coldwater) _____ to _____
- ☐ Coldwater B (Coldwater) _____ to _____
- ☐ Diverse Fish and Aquatic Life _____ to _____
- ☐ Tolerant Fish and Aquatic Life (LFF) _____ to _____
- ☐ Very Tolerant Aquatic Life (LAL) _____ to _____

Other Applicable Uses (as recognized by existing administrative rule):
- ☐ Outstanding Resource Water
- ☐ Exceptional Resource Water
- ☐ Great Lakes System
- ☐ Public Drinking Water Supply
- ☐ Recreational Use
- ☐ Wildlife

Community Types:
- ☐ Class I Trout
- ☐ Class II Trout
- ☐ Class III Trout
- ☐ Coldwater A
- ☐ Coldwater B
- ☐ Game Fish
- ☐ Non-Game Fish
- ☐ Macroinvertebrates
- ☐ Endangered/Threatened Species
- ☐ Intolerant Species
- ☐ Coolwater
- ☐ Tolerant Fish
- ☐ Tolerant Macroinvertebrates

Water Body Name	WBIC #	Date

Use Designation Information (continued)

Basis for Use Designation Decision (List and briefly discuss key elements for the decision) – Use Attachment A, if necessary

Discharger Information – Required

Municipality/Company	WPDES Permit Number	Date Permit Issue	Permit Renewal

Outfall Location

Contact Person	Contact Date(s)

Did a Representative Observe Field Assessment? ☐ Yes ☐ No

Representative	Telephone Number (include area code)

Comments about facility representative's observations, etc.

Literature Review – Use Attachment B, if necessary

1. Previous classification reports and use designations – cite here and attach

2. All previous studies and data associated with the water body that are applicable to use designation – cite here and attach

3. Is stream listed as trout water in Wisconsin Trout Streams? ☐ Yes ☐ No If yes, cite here and attach a copy

4. Any other literature applicable to the fish and aquatic life use designation – cite here and attach

5. Summarize and interpret the literature available and how it relates to and supports the recommended use designation

Water Body Name	WBIC #	Date

Field Assessment Data and Observations – Use Attachment C, if necessary

Assessment Date (mm/dd/yyyy) Additional Assessment Date(s):

Stream Segment Physical/Chemical Data:

Length _____ ☐ feet ☐ meters ☐ miles
Avg. Width _____ ☐ feet ☐ meters
Max. Width _____ ☐ feet ☐ meters
Avg. Depth _____ ☐ feet ☐ meters
Max. Depth _____ ☐ feet ☐ meters

Gradient _____ Velocity _____

Substrate Material:

Silt _____% Organic _____%
Rubble _____% Gravel _____%
Sand _____% Other _____%

Stream Flow _____ cfs ☐ Measured ☐ Estimated
At time of assessment, flow was: ☐ High ☐ Low ☐ Very Low
7Q2 Flow _____ cfs
7Q10 Flow _____ cfs

Stream Temperature _____ °C ☐ Instantaneous ☐ 24-Hr. Maximum ☐ 24-hr. Avg.
Dissolved Oxygen (Instantaneous) _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Minimum Dissolved Oxygen Recorded _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Maximum Dissolved Oxygen Recorded _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Method of Analysis: ☐ Meter ☐ Modified Winkler Method

Effluent Flow:

Daily Average _____ cfs ☐ Measured ☐ Estimated
Design Flow _____ cfs (Convert MGD to cfs by multiplying by 1.55)

Chemical Data Collected: (STORET # _____)

☐ Ammonia ☐ Pesticides ☐ Other: _____
☐ Atrazine ☐ Phosphorus ☐ Other: _____
☐ Bacteria ☐ Metals ☐ Other: _____

Brief Interpretation/Comments:

Habitat – Use Attachment D, if necessary

Procedure:
☐ Guidelines For Evaluating Fish Habitat in Wisconsin Streams (Simonson, Lyons and Kanehl, 1994)
☐ Development and Evaluation of a Habitat Rating System For Low Gradient Wisconsin Streams
☐ Other – Describe: _____

Habitat Rating – Attach Habitat Rating Forms: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Significant Problems Affecting Use Attainment:
☐ Low-flow ☐ Sedimentation ☐ Bank Erosion ☐ Ditching ☐ Fish Cover ☐ Depth
☐ Other – Describe: _____

Observations About Habitat Quality:

Water Body Name	WBIC #	Date

Biological Data – Fish data is required

Fish:

Sampling Date (mm/dd/yyyy) _____

Species List and IBI Forms: ☐ Attached to Report ☐ Not Applicable

Survey Location(s) _____

Distance Sampled _____ ☐ feet ☐ meters ☐ miles

Sampling Gear: ☐ Backpack Shocker ☐ Other – Describe: _____

Number of Species Collected _____ Total Number of Fish Collected _____

Number of Intolerant Species _____ % Intolerant Species _____

Endangered or Other Special Category Species Collected:

Species _____ No. of Individuals Collected _____

Species _____ No. of Individuals Collected _____

Species _____ No. of Individuals Collected _____

IBI Score _____ Rating _____

Macroinvertebrates:

Sampling Date (mm/dd/yyyy) _____ ☐ HBI ☐ FBI

Survey Location(s) _____

Sampling Procedure _____

☐ Less than 100 organisms were found – List Dominant Genera, etc.:

Genus _____ Number Found _____ HBI Score _____

Genus _____ Number Found _____ HBI Score _____

Genus _____ Number Found _____ HBI Score _____

☐ More than 100 organisms found – Attach taxonomy bench sheet or other analyses

Other Biological Data/Observations – Use Attachment E, if necessary

Interpretations Based on Existing Fish and Aquatic Life Community – Use Attachment F, if necessary

WATERSHED DATA AND OBSERVATIONS – Optional (Please answer to the best of your ability. Estimates are acceptable.)

Approximate Area _____ ☐ Acres ☐ Square Miles

Land Use: Crop Land _____% Pasture _____ % Forest _____%

Grass Land _____% Urban _____ % Wetland _____%

Number of Feedlots/Barn Yards Near Stream _____

Other Nonpoint Sources _____

Water Body Name	WBIC #	Date

WATERSHED DATA AND OBSERVATIONS (continued) – Use Attachment G, if necessary

Is this watershed currently or proposed to receive nonpoint source management under a State, Federal or local organization?

☐ No ☐ Yes List Date(s) (mm/dd/yyyy) _____ _____ _____

Explain _____

Discuss nonpoint source impacts and controllability, and nonpoint relationship to fish and aquatic life existing and attainable uses. Include factors such as bank erosion, land cover/use near stream, gully erosion, barnyards, etc. (attach additional sheets if required):

VTAL/TFAL Justification – Required – Use Attachment H, if necessary

Note: This section must be completed when the use designation is tolerant fish and aquatic life (formerly LFF) or very tolerant aquatic life (formerly LAL)

Recommended Attainable Use Designation: ☐ **TFAL** ☐ **VTAL**

Tolerant Fish and Aquatic Life and Very Tolerant Aquatic Life use designations (LFF & LAL) are not defined as full fish and aquatic life uses. However, these uses are in most cases the best use that can be attained by these resources due to habitat or water quality limitations. A designated use recommendation into one of these sub-categories must be based on one or more of the following factors (sec. 283.15, Stats.). Check all that apply to this use designation and provide a brief description of the situation:

☐ a. Naturally occurring pollutant concentrations prevent the attainment of a full fish and aquatic life community.

☐ b. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of a full fish and aquatic life community, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating water conservation requirements.

☐ c. Human caused conditions or sources of pollution prevent the attainment of a full fish and aquatic life community and cannot be remedied or would cause more environmental damage to correct than to leave in place.

☐ d. Dams, diversions or other types of hydrologic modifications preclude the attainment of a full fish and aquatic life community, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of a full fish and aquatic life community.

☐ e. Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of a full fish and aquatic life community.

Description:

Prepared By

Preparer Signature	Printed Name	Date Prepared

Water Body Name	WBIC #	Date

Author and Peer Review

The author should submit a peer-reviewed report to Watershed Program Coordinator for review and approval.

Submitted By	Date
Peer Reviewed By	Date

Approval Signatures

Review, approval, and signature by the Watershed Program Coordinator (Expert), Regional Water Leader (or designee) as well as the Water Quality Standards Section Chief (or designee) is required.

Printed Name of Watershed Program Coordinator (Expert)	Watershed Program Coordinator (Expert) Signature	Date
Printed Name of Regional Water Leader (or designee)	Regional Water Leader (or designee) Signature	Date
Printed Name of Water Quality Standards Section Chief (or designee	Water Quality Standards Section Chief (or designee) Signature	Date

Final Report Distribution List

Once the Use Designation Report has been approved by the Water Quality Standards Section Chief (or designee), the report can be distributed to the appropriate individuals, as listed below. Please indicate below individuals who should be copied on final report distribution. It should be noted that the classification recommendation in the report does not become official until it is approved by the Natural Resources Board and adopted into Wisconsin Administrative Code.

Facility Contact _____

Basin Engineer _____

Basin Planner _____

Effluent Limits Calculator _____

Endangered Resources _____
(when T&E Species Present)

Other Interested Parties:

_____

_____

_____

Fish and Aquatic Life Use Designation Summary
Attachments for Form 3200-121

Attachment A: Basis for Use Designation (p2)

Attachment B: Literature Review (p2)

Attachment C: Field Assessment Data and Observations (p3)

Attachment D: Observations about Habitat Quality (p4)

Attachment E: Other Biological Data/Observations (p4)

Attachment F: Interpretations Based on Existing Fish and Aquatic Life Community (p4)

Attachment G: Watershed Data and Observations Discussion (p5)

Attachment H: VTAL/TFAL Justification (p5)

Additional Attachments: Map, photos, other information